



FRIDAY, JULY 9, 1897.

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Contributions.

Greater Safety at Night than in the Daytime.

CHICAGO, June 29, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

On the night of June 24 a freight train was wrecked on the St. Paul road near Dedham, Ia., by breaking in two, and several persons were injured. A wrecking train was sent immediately with surgeons to assist in caring for the injured, but while running at a high rate of speed it collided with a freight train going in the opposite direction and both engines were demolished. The engineers and firemen of both engines jumped just before the collision, thus saving themselves from possible death, but Dr. R. R. Williams, of Manning, and Dr. Graham, of Maquilla, who were on the wrecking train, were both badly injured.

It is hardly within the range of possibilities that a head-on collision like this could occur in the night if the engines were equipped with electric headlights. Here is a text for a splendid sermon, which we hope will appear in your next issue.

R. C. VILAS,
Pres. Pyle-National Electric Headlight Co.

Electric Haulage at Port Chalmette.

NEW ORLEANS, July 1, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Chalmette is not unknown to fame. It is now 82 years and six months since an English army under Lord Packenham stopped short before a line of American riflemen under Gen. Andrew Jackson on this historic spot. The occasion was the "Battle of New Orleans." Most of the English are here still; but all that is quite another story.

Port Chalmette is on the east bank of the Mississippi River, seven miles below the central thoroughfare of the city of New Orleans, and is the terminal of the great belt system of the city known as the New Orleans & Western Railroad. The commerce of New Orleans has within the past few years assumed such proportions as to necessitate greater and cheaper facilities than the city has hitherto enjoyed. Port Chalmette originated from this necessity. The wealthy and public-spirited capitalists of New Orleans three years ago acquired 3,000 acres; covered wharves were immediately erected, extending 3,000 ft. along the river; three immense steam hydraulic cotton compresses, a grain elevator of 500,000 bu. capacity, 16 vast warehouses, two extensive freight-assorting sheds, and complete water and electric light systems promptly followed, and in the early months of 1896 a grand new industrial plant opened for business.

The advantages to be derived from this great outlay of capital were, first the attraction of ocean steamers to a port where no wharf duties were charged; secondly, the reduction of expense in handling the annual crops, the lumber export and the enormous iron output of the furnaces of Alabama and Tennessee; thirdly, the elimination of all fire risk, never absent in a populous city; and, fourthly, in consequence of the last, the great reduction of insurance rates on the commodities passing through the port.

It was found necessary to build 12 miles of railroad on the grounds, five of which is standard gage steam road, and the remaining seven miles of 36-in. gage is now worked by electricity. The original intention of the company was to do the haulage in the yards of the port, between the assorting sheds, the warehouses, compresses and wharves by compressed-air locomotives. As the season progressed in the summer of 1896 the company decided to adopt electricity, and contracted with the General Electric Company for the complete plant.

The boilers originally used for the compressed-air haulage system, consisting of one battery of two 72-in. x 18-ft. horizontal tubular boilers, built to carry 120 lbs. working pressure, were utilized for the electric plant. The generating unit consists of a 17-in. x 24-in. high-speed Corliss engine, direct connected to a multipolar 150-K. W. 500-volt generator running 200 revolutions a minute. The switchboard is of the standard, slate-pannel, street railroad type, from which run four feeders to the different parts of the yard, permitting the cutting out of a section of trolley line in case of accident or fire.

The trolley system is exclusively used. It is a model of street railroad construction. It was a difficult piece of work, due to the number of short radius curves, about 75 in all; the longest unbroken tangent being only 1,300 ft. The track is laid with 35-lb. steel rails, bonded and used as return for the current. The grade is 2 ft. below the level of the floors of the warehouses and compress platforms so the cotton can be trucked on and off the flat cars. The four locomotives are of what is known as the General Electric Company's "factory type" similar in construction to the ordinary street car without the body or seats. They weigh seven tons, all of which is supported on spiral springs on the two driving axles, each axle carrying a 25-H. P. single-reduction narrow-gage motor. The motors are controlled from one end of the locomotive by a type K. R. controller. The trolley is swiveled on a stand mounted in the center of the platform. The brakes are worked by a hand ratchet mounted near the controller. The locomotives have four sand boxes operated by two pedals, one for each end. The drawbar pull is 2,500 lbs. at a speed of six miles an hour, but at starting a pull of 4,000 lbs. has been exerted. The car equipment consists of 75, 30-foot, flat cars mounted on two double trucks with 18-inch wheels; there are no brakes or springs on these cars. The frames and trucks are made entirely of steel. The weight of the car is 6,500 lbs. The maximum loads that have been handled are 218 bales of uncompressed cotton, about 54 tons, loaded on 11 cars, pulled over three-quarters of a mile of level track at a six-mile speed, and 198 bales of compressed cotton, about 49 tons, loaded on seven cars up a half mile of 30-foot grade at a four-mile speed. The average daily mileage has been in the busy season 25 miles per locomotive handling 1,800 bales.

Since the operation of the plant there have been no fires attributable to the electric system. The economy of the system, compared with compressed air, has been proved beyond doubt. The cost of transporting a bale of cotton from the assorting sheds, where it is unloaded from the railroad cars to the wharf, where it is loaded on ships for export, not including the trucking, is two cents, as against two and one-half cents when hauled by compressed-air locomotives. This economy is in great part due to the saving in track maintenance. Another economy is in the reduced coal consumption due to the higher efficiency of the electric system, and to the employment of less skilled labor to operate and maintain the plant.

The compressed-air plant which this company has abandoned was operated for about 12 months. The compressor is of the straight-line, triple compression type, with 20-in. x 24-in. steam cylinder and 5½-in., 9-in., 12-in. x 24-in. air cylinders. The high and intermediate cylinders are single acting. The capacity is about 400 cu. ft. of air compressed to 600 lbs. pressure per hour. The three locomotives are of the four-wheel type, 9-in. x 14-in. cylinders, 24-in. driving wheels. They carry two reservoirs 30 in. in diameter by 14 and 16 ft. long respectively, having a capacity of 147 cu. ft. The reservoirs are built to carry a pressure of 600 lbs. per square inch. An intermediate hot-water reservoir is carried under and between the main tanks. Into this heater the air is admitted through a reducing valve, whence it passes to the working cylinders at a pressure of about 150 lbs. per square inch. The weight of the locomotive is 28,000 lbs. The drawbar pull is 4,000 lbs. at six miles an hour. Although these locomotives have a greater drawbar pull than the electric locomotives, they have not hauled proportionately greater loads owing to the resistance of longer trains on the many short-radius, reverse curves and to their inability to start such heavy trains.

The failure of the air system to satisfy the demands made upon it at Port Chalmette is attributable, in the writer's opinion, to causes entirely extraneous to the system itself. The causes were the absence of convenient charging stations, insufficient storage capacity on the grounds, and the consequent considerable loss of time in recharging a locomotive. The life of an engine charged at 600 lbs. pressure averaged 50 minutes; the time consumed in recharging averaged 25. Not infrequently an engine died on the track, necessitating much extra labor in switching and hauling back to the charging station.

G. F. P.

[Some comment on this letter will be found on the editorial pages.—EDITOR RAILROAD GAZETTE.]

The Master Mechanics' Association.*

The scholarships at the Stevens Institute of Technology are not sought for as anticipated. The Secretary has received several inquiries from members about the examinations to the Stevens Institute to be held this month, but it is not possible to ascertain definitely whether the

* Extracts from the address of the President, Mr. R. H. Soule, at Old Point Comfort.

two scholarships which we will then become entitled to will be filed or not.

We may properly congratulate ourselves on the general success so far achieved by the association and it is doubtful whether the most enthusiastic of the founders who launched this venture 29 years ago could have predicted a greater degree of success than has been realized. From a membership of 41, which was enrolled at the first regular meeting, held at Cleveland in 1868, we have grown to a body of about 620 members at this time, with every certainty of still further accessions to our ranks. It is believed that ours is to-day the largest of any of the numerous railroad associations in existence; all, except one, of which have been organized since the Master Mechanics' Association.

The conditions which surround us to-day are in most respects different from those which existed in 1868, when this association was formed. Facts which are now accepted as commonplace truths were questioned and debated in those early days with the utmost vigor and zeal. At the first annual meeting in 1868, the following subject was discussed: "Are steel plates preferable to iron in the construction of locomotive boilers, and if so, will the difference in strength, durability and safety justify the excess of cost of steel as compared with the cost of the best iron?" but the tidal wave of growing opinion in favor of steel carried the committee along on its crest so that in the proceedings of the next, or second annual convention, in 1869, the following is recorded: "Your committee feel warranted in deciding emphatically in favor of homogeneous steel for all fire-boxes burning bituminous coal." In the same year, 1869 it was recorded of steel tires that "though at first adopted with hesitation and received into general use only within about four years, they are already in a large majority, and their superseding of all others is rapidly becoming universal." At the third annual session in 1870, the death knell of wood as a locomotive fuel was sounded by a committee which went on record as predicting that bituminous coal then bid fair to become the standard fuel for coming time. They were not so far along in the matter of lubrication, however, for at the fourth session, in 1871, a committee on lubricating oils reported that the general preference at that time for a lubricant for the machinery of the locomotives of fast passenger trains was pure lard oil, and for a cylinder lubricant pure refined tallow.

Such success as has been achieved by the association should be very largely credited to the wise forethought of the founders and to those who, taking up the work after them, from time to time modified the constitution and by-laws, to meet altered conditions and to broaden the scope of the Association. So cleverly has this been done, that men versed in practice and men versed in theory have been drawn into our ranks. The result, to the mutual benefit of all, being, that the practical men have learned to respect sound theory, and the theoretical men have learned to respect sound practice.

Since we met a year ago there has been much activity in our chosen calling. In locomotive practice a marked tendency has been the use of higher steam pressures even in simple engines, and there are some indications that the now general practice of building simple locomotives to carry perhaps 150 lbs. pressure will be superseded by an accepted practice of carrying perhaps 190 lbs. pressure. By many it is believed that the pressure of maximum economy for a simple locomotive working under average conditions of service will be found to exist in the neighborhood of 180 lbs. The logical sequence of this will be that designers and builders of compound locomotives, in order to hold their own in the matter of fuel economy, as compared with simple engines, will be forced to use higher pressures than have hitherto been customary even in compound engines.

The past year has been signalized by the production of a number of individual types of locomotives for passenger service, some having very large driving wheels and boilers. The piston valve is growing in favor; this may be regarded as one of the results of the tendency toward the use of higher pressures, and the necessity of having valves which are perfectly balanced. The effort to reduce weights of reciprocating parts in high-speed engines has been continued, but there is much work remaining to be done in this direction. In freight engines there is a tendency toward the use of larger cylinders and larger wheels, resulting in reduced speed of reciprocating and vibrating parts, with the incidental benefits of better steam distribution and reduced wear and tear on machinery. In the details of valve motion gear the tendency is toward decreased lead and increased inside clearance. The general tendency toward the use of high pressures and ample steam supply in locomotive service has been reflected in the increased use of cast-steel in order to lighten the parts which are susceptible of such treatment, and to permit of an increase in the size and weight of the boiler; it has also been reflected in the efforts of the manufacturers of injectors to produce boiler feeding instruments which will more perfectly adapt themselves to the wide variation of conditions which are found in the current performance of engines which are adapted to carry very high boiler pressures. These conditions are very exacting, as successful feeding instruments must give a wide range of deliveries under every possible combination of surrounding conditions.

The tendency of the locomotive designer has always been to produce a machine somewhat heavier than the track will comfortably carry. In our judgment

this tendency should be indulged, within safe limits, as a locomotive may be in current use for a period of perhaps fifteen years, during which time it becomes no heavier, whereas the constant tendency in track and bridge construction and maintenance is toward heavier and stronger parts and increased carrying capacity. It is true that the application of power brakes to the locomotives of most large roads has been advanced to the point where the completion of the equipment of all locomotives is within easy reach. This suggests a new era in the matter of the movement of freight trains at least, a prominent feature of which will probably be increased speed; a considerable saving in capital account will result from the greater amount of service which can thus be realized from equipment now in existence. The tonnage rating of locomotives is an accepted feature of improved railroading. Operating officers of railroads are very exacting in their demands that each and every locomotive should produce a tractive effort fully proportionate to its weight on drivers.

While we were in session at the Saratoga Convention of 1896, an English correspondent of one of our technical railroad journals wrote that two of the large English railways had brought out express engines of a size hitherto unknown, these engines being distinguished more especially by their great steam producing capacity and by the fact that they had 1,400 feet of heating surface. Some of our fast passenger engines which have been produced during the year have a heating surface of over 2,200 sq. ft., while some recent heavy freight engines have a heating surface in the neighborhood of 2,900 sq. ft. During the year the claim has been made that one of our modern compound passenger engines has developed work up to the unprecedented figure of 1,700 H. P.

It was said long ago that extravagance in fuel consumption would be the penalty which users of locomotives would have to pay on account of the high degree of concentration in the relative arrangement of boiler and machinery which were imposed by the conditions of railroad practice. We feel no discredit, therefore, when we call attention to the fact that as compared with stationary practice, where, in general, room is unlimited, and with marine practice, where room, though limited, is more abundant than is possible in locomotive practice, nevertheless, we are but a short distance behind in the matter of fuel consumption as expressed in pounds of coal consumed per horse-power per hour; some figure representing what is believed to be the average results of recent good practice are, for stationary plants 1.48, for marine plants 1.31, for locomotive service 2.50.

In the matter of machine design as applied to tools which are commonly used in railroad shops, the tendencies have been toward types which embody a high degree of power with firmness and solidity, the whole combined with a capacity to take a great variety of work and with an adaptability to perform as many different operations on a given piece of work as possible.

Among the happenings of the year which we have reason to feel pride in is the action of the American Association of Steel Manufacturers, in adopting the form of decimal gage for sheet metal and wire which was recently adopted by our association jointly with the American Society of Mechanical Engineers. This gage is properly known as the Master Mechanics' gage, as it was our own Association which took the initiative in advocating its adoption.

We separated a year ago with hope that we were on the threshold of better times, but we now look back over the year only to realize that the hopes of railroad managers in this respect have been disappointed, but the benefit which has followed this condition of things is the necessity which has been upon us for continued forced economies: in our judgment, the men in charge of mechanical operations of our American railroads are to-day very much better men than they would have been had the last few years been a period of prosperity; each one of us has had the fact forced home to his convictions that railroading is, after all, a commercial problem and that the technical features of it are only secondary, and must always be subordinated to economic considerations. One of the logical results of the pressure which has been applied to operating officers, even to those in charge of sub-departments, is that there has been a general effort to obtain and keep in shape for current reference all kinds of statistical information which reflects the results of operating.

To our mind one of the greatest difficulties in railroad practice is to ascertain facts; in study a problem which involves a knowledge of the operations or practices of railroad employees scattered over a wide territory, the most difficult thing of all is to secure a correct idea of facts as they exist. If the facts can be obtained, and if they can be relied upon as facts, any operating officer who has good judgment can, in general, draw correct inferences and reach proper conclusions and take such necessary action as may be warranted by the facts, in order to secure improved results. I would emphasize the importance of great care on the part of those sub-officers of railroads who are in close contact with the work and the force, in responding to inquiries from superior officers, if those inquiries involve a statement of facts.

The reports and discussions at the annual conventions of our own and our sister association may be and are reduced to a smaller compass and a narrower space of time than if this preparatory work was not done by the railroad clubs. If it is conceded that such is the case, I think that we then ought to seriously consider whether

we cannot secure joint action on the part of the Master Car Builders' Association and the Master Mechanics' Association to the effect that the time covered by the conventions of these two associations should be brought within the limits of a single week. Railroad managers by training and temperament have a habit of expecting and exacting the largest measure of results from a given expenditure of time, and although the results from these conventions are highly creditable, yet there is undoubtedly an undercurrent of feeling among railroad managers that the same results could be achieved within a smaller compass of time. If the membership in general becomes convinced that such a feeling does exist in fact, it would be the part of prudence to anticipate any open expression of it, and to so modify the working schedule of our annual conventions that the total amount of time required to attend the conventions of both associations need not exceed a single week.

As the use of electricity as a motive power is increasing, and as the great majority of our members have not been schooled in the applications of electricity as a means of propulsion, I would advise the appointment of a committee to report on the state of the art at the convention of 1898. Such a report would be largely educational in its influence on the members, and would be appreciated by them.

*Ratio of Grate Area, Heating Area and Cylinder Volume.

The problems given to this committee to investigate and report on were the proper ratio of heating surface and grate area to cylinder volume for passenger and freight engines, whether burning anthracite or bituminous coal, and also the ratio which should exist between the size of cylinder and the length of the steam port. The plan followed was to make an analytical de-

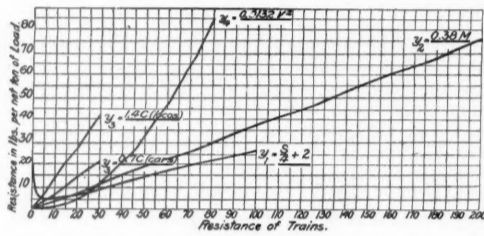


Fig. 1.
Ordinates give resistance in pounds per net ton of load, = y_1 .
Abscissæ represent S, M, C or V .
 S = speed in miles per hour.
 M = grade in feet per mile.
 C = curvature in degrees.
 V = speed in miles per hour attained in one mile.

termination of the points in question, and compare this with the results obtained in practice. In order to follow out an analytical discussion it was first necessary to determine approximately the following factors:

The force necessary to move a train of a given weight at various speeds and accelerations over various grades and curves.

The ratio of mean effective pressure in the cylinders to the initial pressure for various speeds, cut-offs and lengths of steam port.

The ratio of the pressure at cut-offs to the initial pressure for various speeds, cut-offs and lengths of steam port.

The evaporative value of different fuels at various rates of combustion per square foot of heating surface.

The evaporative value of different fuels at various rates of combustion per square foot of grate area.

The following formulæ were taken as representing the train resistance:

$$\text{For resistance due to speed} \\ y_1 = \frac{S}{4} + 2$$

where y_1 = resistance in pounds per net ton of load.

S = speed in miles per hour.

The force for starting is, however, about 20 lbs. per

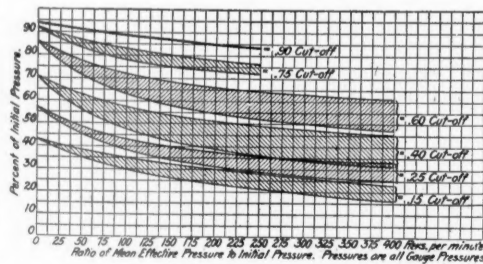


Fig. 2.

ton, which falls to 5 lbs. as soon as a low rate of speed is reached.

For resistance due to grades $y_2 = 0.38 M$; where y_2 = resistance in pounds per net ton of load, M = grade in feet per mile.

This represents the component of the load acting in the line of traction or parallel to the track.

* From the report of the Committee of the American Railway Master Mechanics' Association, consisting of Messrs. G. R. Henderson, A. S. Vogt, R. Wells, S. M. Vauclair and C. J. Mellin.

The resistance due to curves was taken to be $y_3 = 0.7 C$ for cars, $= 1.4 C$ for locomotives; where y_3 = resistance in pounds per net ton of load, C = curvature in degrees.

The resistance due to acceleration of the speed of the train, including the rotative resistance of the wheels and axles, was shown to be expressed by the formula

$$y_4 = 0.0132 V^2$$

where y_4 = resistance in pounds per net ton of load, V = speed attained in one mile, expressed in miles per hour, starting from rest.

This same formula can be used for an increase of

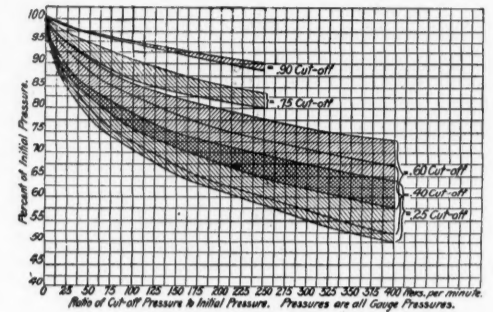


Fig. 3.

speed from a velocity V_1 to a velocity V_2 by substituting for V^2 the difference $V_2^2 - V_1^2$.

Fig. 1 is a graphical representation of the formulæ for train resistance.

Fig. 2 gives the ratio of mean effective pressure to initial pressure for various cut-offs and speeds. The shaded zones or bells represent the practical limits of port length in locomotive construction. For instance, the upper portion of a zone represents what may be expected when using an Allen valve, or when the length of port in inches bears approximately the ratio 0.12 to the area of the cylinder in square inches, and the lower portion when the ratio is approximately 0.05. This diagram was constructed from the data given in the report of the Committee on Slide Valves in the Proceedings of the M. M. Association for 1896.

Fig. 3 gives similar information in regard to the cut-off pressures, and the explanation above will answer for this also. Figs. 2 and 3 were verified as far as possible, with gratifying results. A clearance of 8 per cent. was allowed in computing these curves, and the pressures are all "above the atmosphere."

Figs. 4 and 5 represent the evaporative value of different fuels at various rates of combustion, but on account of the many varying conditions in coal tests, dia-

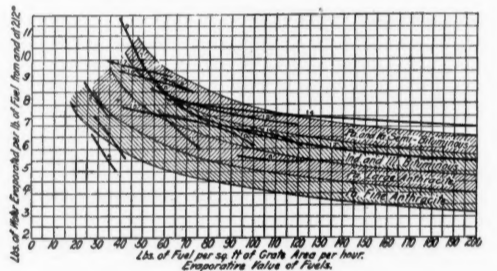


Fig. 5.

grams of this kind are but mere approximations. The following table is an index to Figs. 4 and 5:

INDEX TO EVAPORATIVE VALUE OF FUELS, FIGS 4 AND 5.

No.	Location of mine.	Kind of fuel.	Ratio of heating surface to grate area.
1.....	Pennsylvania	Anthracite, large	45
2.....	"	"	20
3.....	"	" fine	20
4.....	"	"	20
5.....	"	Semi-bituminous	70
6.....	"	"	84
7.....	Virginia	"	66
8.....	"	"	57
9.....	"	"	49
10.....	Illinois	Bituminous	50
11.....	"	"	55
12.....	"	"	71

No. 13 had a ratio of heating surface to grate area of 100, but the kind of fuel is not positively known—it probably resembled a lignite.

No. 14 represents Professor Goss' experiments with diminishing grate areas.

Nos. 15, 16 and 17 represent the experiments of the Paris, Lyons & Mediterranean Railway, made a few years ago, with various lengths of tubes, the dimensions being 10 ft., 15 ft. and 20 ft. respectively.

From Figs. 4 and 5 it is apparent that there is a loss in efficiency by increasing the rate of combustion per square foot of grate area per hour, being chiefly accounted for by the unburnt coal which passes out of the stack. This loss is represented by No. 14. There is also a loss by increasing the rate of combustion per square foot of heating surface per hour which is due to the fact that the gases pass over the heating surface more quickly, and this loss is partly shown by curves Nos. 15, 16 and 17. From both these causes most of the other curves have an increased slope as they represent the ordinary conditions which exist in locomotive practice. As the results of coal tests vary so widely the value of fuels is best represented by zones instead of single curves,

the upper portion of the zone giving the values of fuel used under favorable conditions while the lower portion gives values obtained under less favorable conditions.

The committee decided that for pressures and temperatures usually found in locomotive practice 1.2 was an average value of the factor of evaporation and that the internal friction of locomotives (not including roll-

times the stroke. Other lengths show but little variation from the table.

The point of maximum rotative force varies 15 deg. each side of the 45 deg. point.

To prevent slipping it was concluded that the average tractive force should not exceed 22 per cent. of the adhesive weight, as this would prevent the maximum rotative force exceeding the 25 per cent found above, in all but the $\frac{1}{2}$ and $\frac{3}{4}$ cut-off, and as the speeds are generally high at these points, the inertia of the wheels, etc., would probably prevent slipping at the maximum points. Fig. 2 gives the ratio of mean effective pressure to initial pressure that may be expected, with various cut-offs and speeds, but the mean effective pressure must never exceed $\frac{0.22 W D}{d^2 s}$ where W = the weight on drivers; also we should always have

$$1.1(y_1 + y_2 + y_3 + y_4)T = \text{or } < 0.22 W \quad (3)$$

The formulas and diagrams given above are sufficient to calculate the performance of a given locomotive or to proportion the grate area and heating surface for a locomotive to do a given amount of work.

Figs. 6 and 7 represent graphically the principal proportions of typical American and foreign locomotives. The lines which are wholly horizontal indicate the values calculated by means of the formulas previously given. In the committee's report the same information, together with additional dimensions of the engines, is presented in the form of numerical tables, which, on account of lack of space, we do not reproduce.

Because of the difference in fuel used and other variations in conditions, there was no attempt made to apply the analytical investigation as outlined to foreign engines.

It was found that, when using coke as fuel, fireboxes similar to those for bituminous coal gave satisfactory results when the heating surface was about 60 times the grate area. The firebox should be made as deep as possible, requiring at least 24 in. below the flues.

Fuel oil can be used in almost any form of firebox, the best location for the burner being just below the mud ring, spraying upward into the firebox. In some recent experiments with oil of 84 deg. gravity, 140 deg. flash and 190 deg. fire test, and in which the boiler had 27 sq. ft. of grate area and 2,135 sq. ft. of heating surface (8 per cent. being firebox surface), it was found that there were about 39 lbs. of oil burned per square foot of grate area, and about 0.45 lbs. per square foot of heating surface per hour, the equivalent

evaporation from and at 212 deg. being about 12½ lbs. of water per pound of oil. It was also computed that there should be about 1-in. width of burner for each

cubic foot of cylinder volume, or the width = $\frac{Vt}{3}$ inches,

Vt being the volume of both cylinders in cubic feet; or

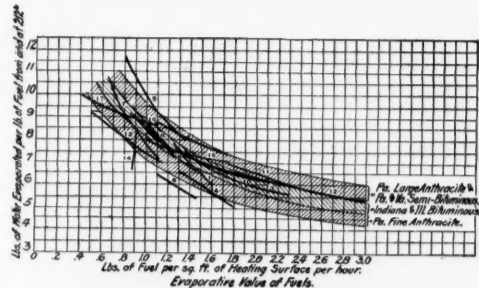


Fig. 4.

ing and journal friction) can be taken as 10 per cent. of the indicated horse-power.

The theoretical tractive force = $\frac{pd^2s}{D}$ where p = mean effective pressure in pounds per square inch, d = diameter of cylinder in inches, s = stroke in inches, D = diameter of driving wheel in inches.

Therefore from what has gone before

$$\frac{pd^2s}{D} = 1.1(y_1 + y_2 + y_3 + y_4)T$$

where T = weight of the train in net tons, including the engine and tender, while the values for y are obtained from Fig. 1.

The mean effective pressure depends principally upon two factors, the boiler pressure and the cut-off, modified by the initial pressure and the speed, which reduces the cut-off pressure below the initial. While the mean effective pressure fixes the tractive force, yet the actual cut-off pressure has an important effect upon the tendency to slip the wheels at different parts of the revolution.

If the friction between the wheels and rail is taken to be 22 per cent. of the adhesive weight, with a loss of 10 per cent. due to the internal friction of the engine, the theoretical relative force at the circumference of the wheel must never exceed 25 per cent. of the weight on the drivers. The following table gives the ratio of max-

RATIO OF MAXIMUM ROTATIVE FORCE TO AVERAGE ROTATIVE FORCE AT VARIOUS CUT-OFFS.

Cut-Off Pressure.	Cut-Off at							
	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
100	1.52	1.31	1.17	1.09	1.10	1.17	1.19	1.20
200	1.47	1.30	1.11	1.09	1.12	1.16	1.19	1.19
Approximate average.....	1.50	1.30	1.15	1.10	1.10	1.15	1.18	1.20

imum rotative force to average rotative force at various cut-offs and cut-off pressures, for a connecting rod whose length is $\frac{9}{16}$ times the crank radius, or about five

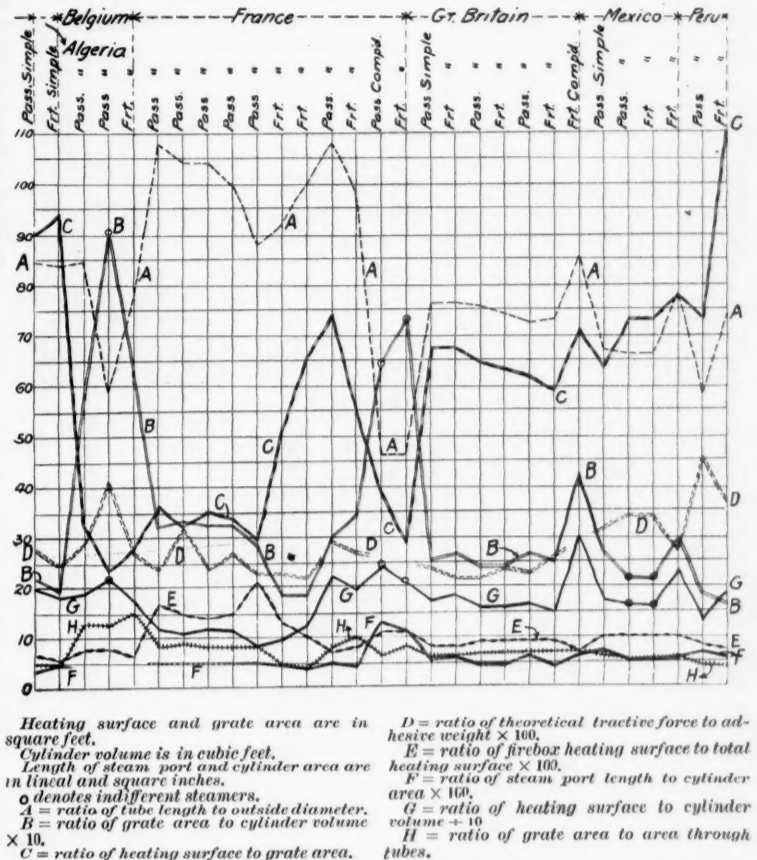


Fig. 7.—Relative Proportions of Foreign Locomotives.

Heating surface and grate area are in square feet.
Cylinder volume is in cubic feet.
Length of steam port and cylinder area are in linear and square inches.
o denotes indifferent steamers.
A = ratio of tube length to outside diameter.
B = ratio of grate area to cylinder volume $\times 10$.
C = ratio of heating surface to grate area.
D = ratio of theoretical tractive force to adhesive weight $\times 100$.
E = ratio of firebox heating surface to total heating surface $\times 100$.
F = ratio of steam port length to cylinder area $\times 100$.
G = ratio of heating surface to cylinder volume $\times 10$.
H = ratio of grate area to area through tubes.

that 1 in. of width was sufficient for 600 sq. ft. of heating surface.

In compound locomotives, the consumption of water will be about 10 per cent. and of fuel about 20 per cent. less than in simple engines, but in calculating the quantity of steam used, the volume Vt should, of course, include only the high-pressure cylinder or cylinders.

The committee could find no reliable data on the relative value of firebox and tube-heating surface, some authorities assuming that the former was worth twice, and some ten times the latter. It will be seen to average in amount about 10 per cent. of the total heating surface.

The ratio of tube length to outside diameter is also important, and recently much longer lengths have been in vogue. The average seems to be about 70 diameters, although in the Paris, Lyons & Mediterranean Railway experiments, 90 diameters gave the most economical results, and this proportion is gradually coming into American practice.

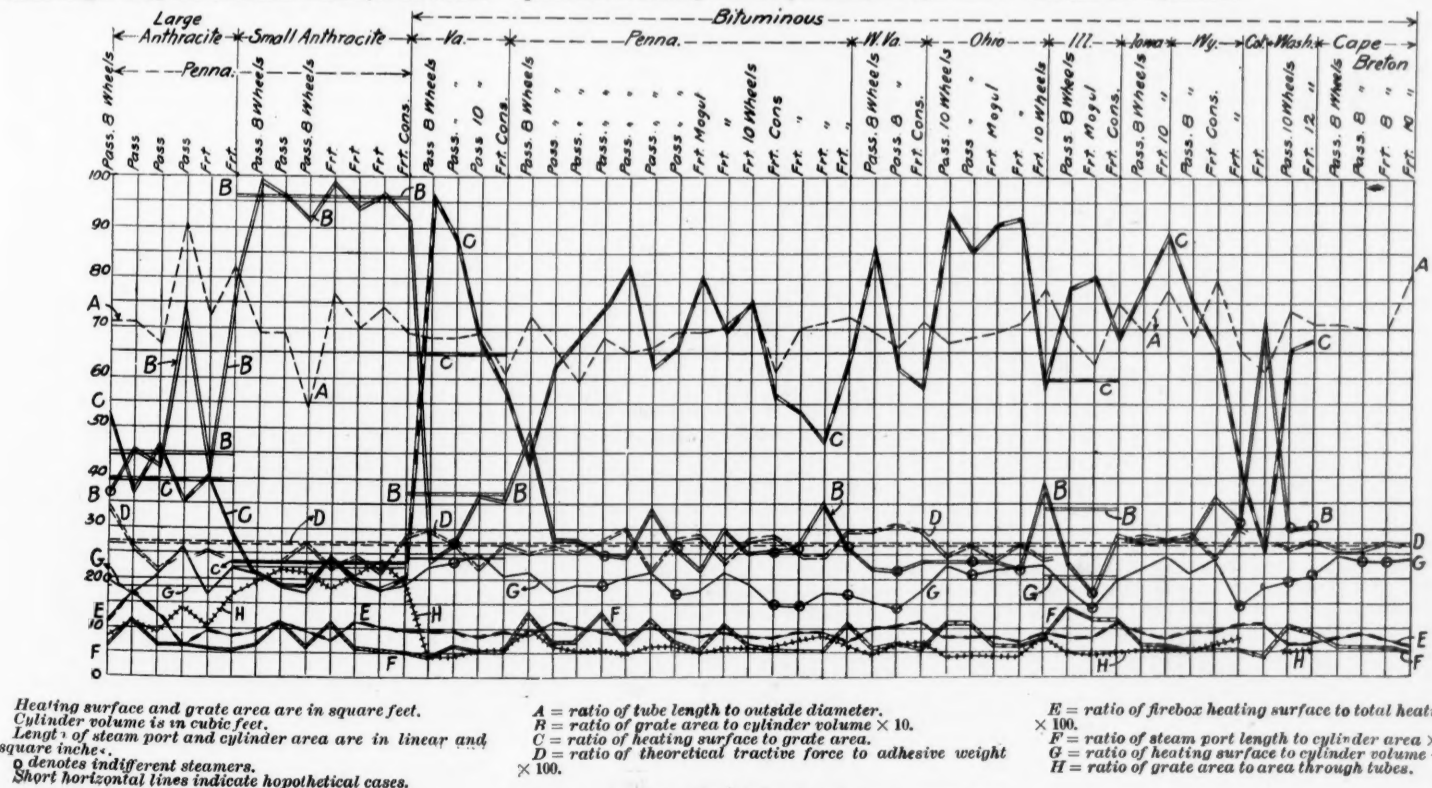


Fig. 6.—Relative Proportions of American Locomotives.

Heating surface and grate area are in square feet.
Cylinder volume is in cubic feet.
Length of steam port and cylinder area are in linear and square inches.
o denotes indifferent steamers.
Short horizontal lines indicate hypothetical cases.
A = ratio of tube length to outside diameter.
B = ratio of grate area to cylinder volume $\times 10$.
C = ratio of heating surface to grate area.
D = ratio of theoretical tractive force to adhesive weight $\times 100$.
E = ratio of firebox heating surface to total heating surface $\times 100$.
F = ratio of steam port length to cylinder area $\times 100$.
G = ratio of heating surface to cylinder volume $\times 10$.
H = ratio of grate area to area through tubes.

After a careful study of the foregoing data, the committee reached the following conclusions:

The ratio of grate area in square feet to total cylinder volume in cubic feet should not be less than:

- 4 for large anthracite coal,
- 9 " small " "
- 3 " bituminous " "

for simple passenger or freight locomotives.

The ratio of heating surface in square feet to total cylinder volume in cubic feet should not be less than:

- 180 for large anthracite coal,
- 200 " small " "
- 200 " bituminous " "

for simple passenger or freight locomotives.

(The proportion for compound locomotives must be figured out by taking the volume of the high-pressure cylinder or cylinders and the desired cut-off in the high pressure cylinder, using the formulae previously given.)

The ratio of heating surface to grate area should not be less than:

- 40 for large anthracite coal,
- 20 " small " "
- 60 " bituminous " "

for passenger and freight locomotives.

For coke and fuel oil, the proportions for bituminous coal may be observed.

The ratio of firebox heating surface to total heating surface should be about 10 per cent.

The ratio of tube length to outside diameter should not be less than 70, and may be as much as 90.

The ratio of steam port length in inches to cylinder area in square inches for passenger locomotives should be preferably about 10 per cent. This can be accomplished either by using piston valves or Allen valves. In the latter case the Allen valve has been considered as doubling the length of the port. In freight locomotives, which normally make less revolutions, the ratio may be from five per cent. to eight per cent.

Finally, the committee stated that their deductions and calculations should always be used with discretion, and in every case the locomotive should be designed for the work it has to do, not merely accepting the general formulae for all varieties of service without modification.

An Old Firm of Engine Builders.

BY HERBERT T. WALKER.*

In the year 1832 George Stephenson entered into partnership with Charles Tayleur, an English engineer of some note, and they built an engineering establishment under the name of Charles Tayleur & Co., at Newton-le-Willows, near Warrington, England, and called it the "Vulcan Foundry." At that time Stephenson, whose capacity for work seemed to be unlimited, was a partner in the firm of Robert Stephenson & Co., of Newcastle-upon-Tyne, but he was a shrewd business man as well as a practical engineer, and he joined Mr. Tayleur in order to get the Lancashire trade, and save the cost of carriage from Newcastle. George Stephenson held shares in the Vulcan Foundry till the time of his death.

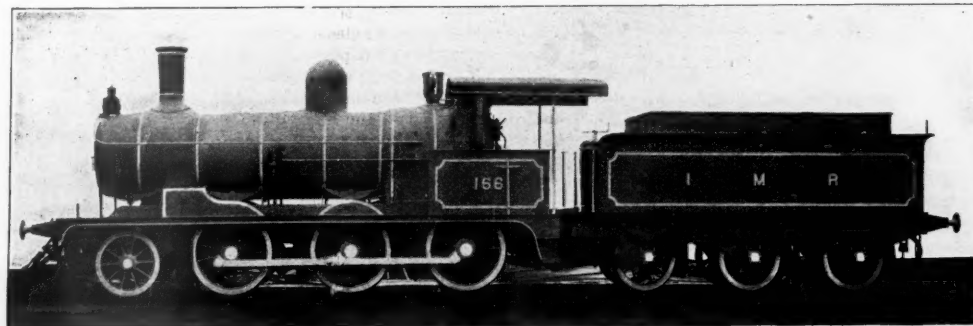
In the early days of railroads, the demand for locomotives was greater than could be supplied by the comparatively small number of engine builders, and Tayleur & Co. were kept busy for many years, some of the best engines of that period having been constructed at their works.

Not the least important part taken by this firm in the development of railroad machinery was in the education

to the Vulcan Foundry Co., and in 1864 it was made into a limited company.

In the year 1833 this firm built two engines for the old Camden & Woodbury Railroad of New Jersey, and subsequently five other engines for America, making a total of seven locomotives sent to this country. An official list of these engines was exhibited at the Columbian Exposition.

An illustration of the "Tayleur," the first engine built



Mogul Freight Locomotive for the Indian Midland Railway

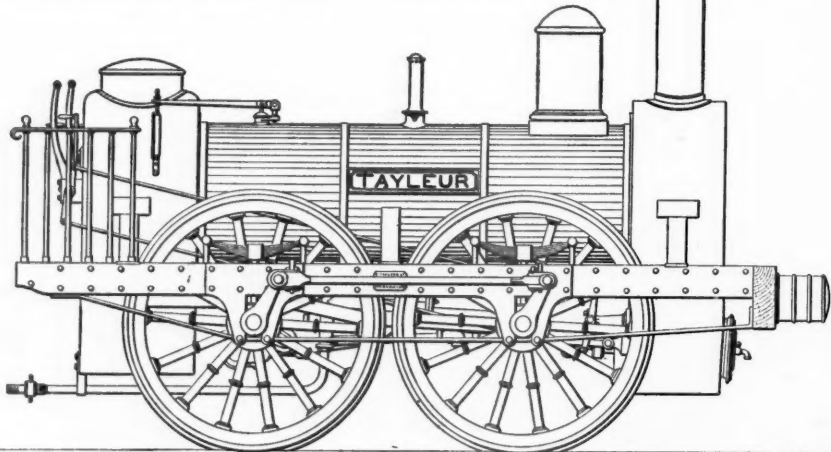
Built by the VULCAN FOUNDRY COMPANY, Newton-le-Willows, near Warrington, England.

at the Vulcan Foundry, is presented in Fig. 1. The original drawing was shown at the World's Fair. This engine has the well-known Stephenson earmarks, and was a very popular design at that period. The engine, with another called the "Stephenson," was made for Mr. Hargreaves, of Bolton. The cylinders were 11 in. x 16 in., and the driving wheels were 4 ft. 8 in. in diameter. Mr. Hargreaves was an engineer who made a contract with the Bolton & Leigh Railway Co. to work its traffic with his own engines, the "Tayleur" and the "Stephenson" being two of them.

The "John Bull," built by Stephenson & Co. in 1831 for the Mohawk & Hudson, was of similar construction to the "Tayleur."

These works have continued to build locomotives from the year 1833 to the present time, nearly every railroad in England and many in other countries having some of their engines in service. For many years past they have supplied large numbers of locomotives to the Indian railroads, and no less than 463 have been either already exported or are now under construction at Newton-le-Willows. The engines supplied to India by the Vulcan Company include practically all patterns. In the year 1881, 30 freight engines were built for the Indian State Railways. They had a leading four wheeled truck and six coupled wheels of 4 ft. 2 in. diameter. Cylinders 18 in. by 26 in. stroke. The tenders (6-wheel) carried 2,000 gals. of water.

An order for 14 engines has just been completed for the Indian Midland Railway. This road does a heavy freight business, having about 735 miles open for traffic. One of the engines, No. 166, is illustrated in Fig.



The First Locomotive Built at the Vulcan Foundry, Newton-le-Willows, near Warrington, England. A. D. 1833.

and training of early locomotive superintendents and railway mechanics. The names of many of these pioneers who received their baptism of fire at the Vulcan Foundry could be mentioned, one prominent one being Daniel Gooch. Gooch's subsequent appointment (when he was but 21 years of age) as Superintendent of Motive Power of the Great Western, which position he filled for 27 years, his magnificent broad gauge engines, his taking a leading part with Brunel in the fierce "Battle of the Gages," and his final promotion to the office of Chairman of the Board of Directors are familiar to students of railway history.

In the year 1847 the name of the firm was changed

*Member of the National Railway Museum Association (England).

2. It is the 1,500th engine turned out by the Vulcan Co. These engines were designed by Sir George Barclay Bruce, C. E., the consulting engineer to the company, and are of the mogul type; the leading wheels, however, run in radial axle boxes and the cylinders are inside. The extended smokebox is tapered merely to give it a lighter appearance and is fitted with a horizontal spark arrester. The engines and tenders are fitted with the automatic vacuum brake. All the brake blocks are equalized, and there are equalizing levers between the first and second driving wheels.

Only best Yorkshire iron was used for all wrought-iron work and Siemens-Martin acid steel of the best quality for boiler plates, connecting and coupling rods, axles and other important parts. The engine axle boxes were cast solid of gun metal and lined with white metal,

An automatic rocking grate arrangement, worked by a lever from the trailing axle of the engine, which can be put in and out of gear at the will of the fireman, was fitted to four of the engines.

With a view to effect a saving in the cost of painting these engines and tenders in India the paneling, lining and lettering was done by riveting in strips of polished zinc, varying in width from 1 to 2 in. These require little cleaning to keep them bright.

Following is a list of the principal dimensions of the engines:

Gage of track.....	5 ft. 6 in.
Diameter of cylinders.....	18 1/4 "
Stroke.....	26 "
Diameter of leading wheels.....	3 " 6 1/4 "
Diameter of driving wheels.....	4 " 6 1/4 "
Length of rigid wheel base of engine.....	13 " 0 "
Total wheel base of engine and tender.....	40 " 7 1/2 "
Tractive force.....	163 3 lbs. for each pound of effective pressure
Diameter of boiler.....	4 ft. 5 1/2 in.
Thickness of boiler plate (steel).....	3/8 in.
Working pressure of steam.....	180 lbs. per square inch
Number of tubes.....	118
Length of tubes between tube plates.....	11 ft. 3/4 in.
Diameter of tubes outside.....	2 1/4 "
Center of boiler from rails.....	7 " 5 1/2 "
Heating surface of tubes.....	1,077 sq. ft.
Firebox.....	103 "
Total heating surface.....	1,180 " "
Area of grate.....	21 1/4 " "
Weight of engine in working order.....	107,320 lbs.
On driving wheels.....	87,360 lbs.

At the present time the Vulcan Co. is constructing 16 six-coupled freight engines, having wheels 5 ft. 1 in. diameter and cylinders 18 in. x 26 in. stroke, for the East Indian Railway; 16 six-coupled freight engines for the Indian State Railways, having cylinders 18 in. x 26 in. stroke, and wheels 5 ft. 1 1/4 in. in diameter. Also for the same railway 40 six-coupled freight engines, with cylinders 19 in. diameter by 26 in. stroke, and coupled wheels 4 ft. 7 in. in diameter.

For the above particulars the writer is indebted to the Vulcan Foundry Company, and Mr. Clement E. Stretton, C. E.

NEW YORK CITY.

The Christian Endeavor Excursions.

The reduction of passenger rates 50 per cent. or more for long distances, primarily for the benefit of the Young People's Societies of Christian Endeavor (and secondarily for the general public, at the excursion season when everybody wants to go somewhere, thus greatly enlarging the traffic which would be produced by even so large an organization as the Christian Endeavor), is not a new thing; these conventions have been held 10 years, and five years ago the movement to New York City was very heavy. But this year is marked by the peculiar condition that the heaviest traffic comes on the roads west of the Missouri River, where ordinary traffic is comparatively light. These roads, however, though "thin," have had long experience with excursions and they have made a great record.

From Chicago it is reported that the Christian Endeavor business has probably broken all previous records of excursion business moving by sleeping cars. The two big sleeping car companies were utterly unable to meet the demands, and large numbers of second-class or tourist sleepers were used. On many roads chair cars were made to serve as sleepers, as were also parlor cars. The Rock Island carried 200 extra Pullmans into Colorado. The Santa Fe, it is reported, carried 136 Pullmans into California. These figures surpass those of the Chicago & Northwestern, which ran 111 sleepers, and of the Burlington, which ran about 90.

IN COLORADO.

A correspondent in Denver writes:

Railroad managers in Colorado have had a good test of their administrative ability. Early in the spring numerous special parties and special car lots were contracted for in the principal Eastern cities. Owing to the years of advertising of Colorado railroads nearly 90 per cent. of the advance contract business was routed through Colorado. The itineraries of these special parties in trains and in single special cars included stopovers in Denver and at Colorado Springs. With arrangements and correspondence the passenger departments were kept constantly busy. No great effort on the part of the Colorado roads was made, however, to induce the public to organize Pacific coast parties, for the amount of money accruing from the through haul hardly paid for the trouble. To get as many people to seize the opportunity of low rates in order to make a

tour into Colorado was the main work of the passenger departments here.

In this preliminary work the Union Pacific, Denver & Gulf, having its attractive side trip over the loop to Silver Plume, which is but a 12-hour ride, made a great effort to induce the California crowds to include that side trip in their itinerary. General Passenger Agent Winchell had some fine printing work done for this purpose, and the result was that he secured the promise of a great traffic during the four or five days of the rush.

Fully 90 per cent. of the travel through Colorado went via the Denver & Rio Grande. The Colorado Midland discouraged the business, yet it had to take 10 special trains which were about the same as forced upon it. These came from the Rock Island, the Atchison and the Gulf. The special trains were delivered to that road at Color-

sprang up as if out of the ground, and each party was anxious to move on, having grown tired of delays on the Eastern roads.

This condition appearing, General Superintendent Sample moved his entire office force down to the depot. The passenger department was on hand to meet all managers with whom there were contracts. Trainmaster J. M. Walker for 80 hours personally attended to the dispatching of trains out of the union station with but two hours for sleep. Locomotives with crews stood just outside the depot yards all day long and extra trains were made up and held ready for switching to the platforms at a moment's notice. As soon as a demand was made upon the Denver & Rio Grande it was promptly met, and there was little if any delay in the departure of contracted parties out of Denver unless they chose to ask for it. Many parties which had planned to make a

pany operates only one road that enters Denver and it delivered about 35 cars. The Colorado Midland, at Colorado Springs, received 65 special cars. The Pullman company delivered special cars there and at the Pueblo gateway. An approximate estimate of the total number of cars bound west through Colorado can be placed safely at 400. This does not include the day coach traffic. The business terminating in Colorado was quite heavy during the continuance of the cheap rates. At a rough estimate about 18,500 people passed through Colorado to California in the Christian Endeavor excursions.

A later report from Denver says: "From the morning of June 30 up to 4 p. m., July 6, the Denver & Rio Grande handled 76 passenger trains into Grand Junction, carrying Christian Endeavor excursionists. Of

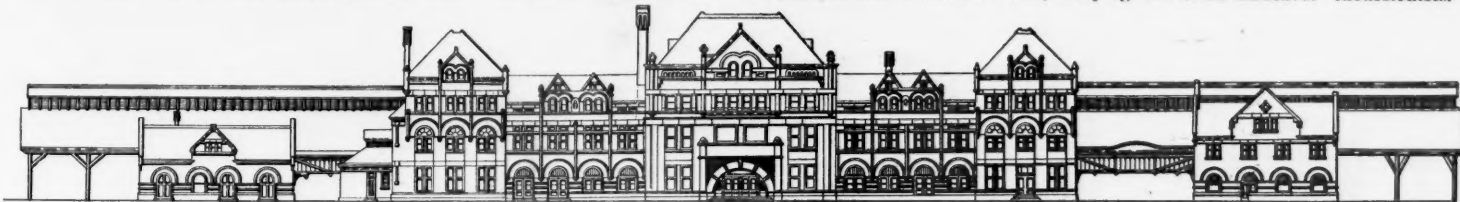


Fig. 1.—Union Passenger Station at Montgomery, Ala., Louisville & Nashville Railroad—Street Elevation.

ado Springs, and were handled through Ute Pass and over the range without any disturbance of regular traffic. The Atchison had some business over the southern route, the Colorado official delegation going that way, and the Union Pacific did some business by way of Cheyenne.

The contracts made with the Rio Grande were irregular as to train movements. Special trains and special cars were to be delivered at Pueblo by the Atchison and the Missouri Pacific, at Colorado Springs from the Rock Island and at Denver from all of the several lines from the Missouri River. Some were to go directly west from Pueblo; others were to make the side trip up to Colorado Springs and over the Manitou branch to the scenic resort of Manitou before continuing westward. Some even had contracted to run north to Denver and then return via Manitou Junction and Pueblo. The trains delivered to the Rio Grande in Denver from Eastern roads were to stop over for the day or for a specified number of hours or were scheduled through with stop-overs at Colorado Springs. When the week opened for this business the mass of details relating to all this contracted business had to be classified and properly arranged so that the transportation department could handle the business without confusion or unnecessary delays.

General Passenger Agent Hooper drew up a schedule similar to a condensed time table which included all the information relating to these special parties; when this was completed there were 38 special parties properly planned for in advance. This schedule showed the number and kinds of cars in each party, the hour and from what road delivered and at what point, what was to be done with the party, where stops were to be made for meals or side trips and the times of departure from all points.

The Transportation Department received blue-print copies of this schedule for the use of all officials, and upon this basis arrangements were made for crews, power, baggage cars, switching at Denver, Colorado Springs and Pueblo, meals, water, the cleaning of cars, etc. Extra men were employed to assist the dispatchers, trainmasters and yardmasters, and all employees having anything to do with the business were called into division headquarters and personally instructed. For two weeks these preparations went on, until every em-

halt of 12 hours in Denver left within 10 minutes after arriving.

The management of the union station was admirable. There was not a moment of blockade during the three days' rush. The trains were received as fast as they arrived, cars were cut out and trains made up, and all without interfering with the running of regular trains. Excursionists were unloaded out of their Pullmans, rushed across the platforms to the Gulf specials for the trip around the "Loop," and as soon as they returned they were quickly loaded into their cars again to be dis-

these trains 57 were specials. It is estimated that there were 16,000 people and there was not a single accident. The Colorado Midland moved 13 trains, estimated to contain 2,500 people. The Rio Grande Western handled all these trains without loss of life or limb or accident of any kind."

An official of the Union Pacific at Omaha says: "On Wednesday, June 30, the Union Pacific ran 23 special trains, carrying 300 or more people on each train. All trains arrived at destination on time. Thursday, July 1, 13 special trains arrived on schedule time or better. Friday, July 2, at 2 p. m., six special trains had been handled. The Union Pacific is carrying 65 per cent. or more of the entire Christian Endeavor business. This last rose-colored statement includes, of course, business going to Denver as well as that taken directly through over the U. P. main line."

Louisville & Nashville Passenger Station at Montgomery.

The accompanying drawings show the ground plan, the side elevation from the street, looking west, and the end elevation, looking north, of a union passenger station now under construction by the Louisville & Nashville Railroad at Montgomery, Ala. This building is located on the river front, between Commerce and Moulton streets, and is a through station. The train shed, except where hidden by the main building, is visible in Fig. 1. It covers four tracks.

The general waiting room is open to the top of the second story, and there is a balcony at the level of the second floor. The third story of the building and the second story, except in the center, contain rooms to be used for offices. The main building and the two-story baggage room (at the north end) and the express and mail building (at the south end) are all of pressed brick, with stone trimmings. The base is of pitched face ashlar Georgia granite and the roofs are of slate. The porte cochere, in front of the main entrance, is 35 ft. square. The train shed is 600 ft. long and has a slate roof.

The first story of the main building has tile floors. All of the buildings will be heated by steam.

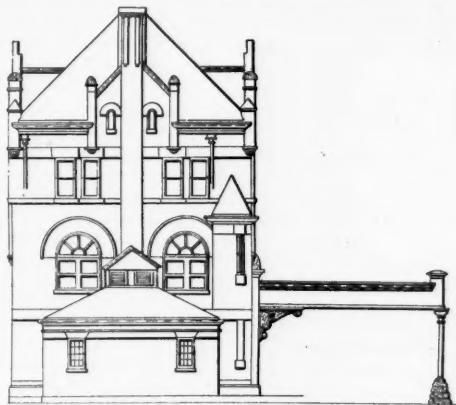


Fig. 3.—End Elevation.

patched to Colorado Springs, where the next halt was made. The parties who had an hour or two in the city were carried off by reception committees while the cars were taken to the yards and cleaned.

The handling of all these special trains was done from the dispatcher's office in Pueblo. The first order was to run to Littleton, 11 miles, the end of the double track out of Denver, where, after registering, the usual train orders for the single track were issued. On Thursday, July 1, there were 27 special trains sent out of Denver by the D. & R. G. On July 2 the number was nearly as many. The running of these trains south to Colorado

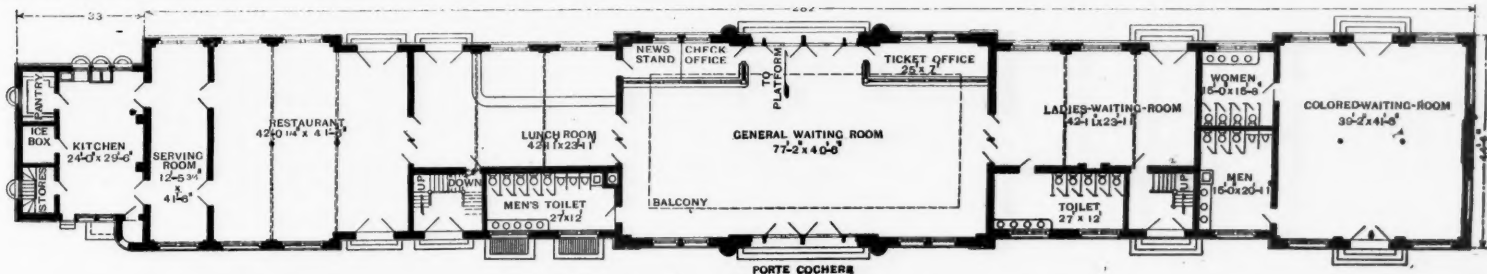


Fig. 2.—Montgomery Union Passenger Station.

ployee was keyed up to the full importance of the occasion. In the union station in Denver a room was fitted up as sleeping quarters for conductors and brake men.

But while all this careful preparation was of some value, schedules were completely upset by delays in the East. The specials grew beyond calculations, while the volume of independent tourist travel grew beyond the most sanguine calculations. There were delays out of Chicago and St. Louis, wrecks on a number of the roads, and a washout or two, so that not a single train was delivered to the Colorado roads anywhere near on time. The delays ranged from four to 12 hours and upset all plans. On the morning of July 4 the Denver & Rio Grande received but little information from the Eastern roads regarding the delayed trains. News came during the morning of additional special sleeping cars, extra coach loads and the attendant extra baggage. Trains

Spring was only a part of the dispatcher's business. There the movement of the trains to Manitou and return, the reception of trains from connecting lines there and their final movement southward through Pueblo had to be considered. As but a small portion of the line between Denver and Pueblo is double track, the work performed in the dispatcher's office entitles the Pueblo force to high credit. In spite of the great train movement westward, the eastbound regular trains arrived in Denver about on time during those three days.

After Pueblo had been passed, it was comparatively easy to marshal the trains across the mountains and deliver them to the Rio Grande Western at Grand Junction. The specials over the Colorado Midland likewise went to the Rio Grande Western at Grand Junction.

During this excursion movement, the Pullman company delivered at Denver from Eastern roads 150 special standard cars and 75 tourists' cars. The Wagner com-

The contractor for the construction of this station is Mr. Charles A. Moses, of Chicago. The heating apparatus will be put in by Joseph McWilliams & Co., of Louisville, Ky. Mr. R. Montfort, Chief Engineer of the road, to whom we are indebted for the drawings, estimates that the total cost of the station, and the grading and pavement of the grounds, will be about \$200,000.

Two-Story Freight-House at Montgomery.

At Montgomery, Ala., the Louisville & Nashville has recently completed a freight-house, two stories high, 50 ft. wide and 545 ft. long. The most noticeable feature of this building is the second story and the provision of three electric elevators for making the upper floor readily available for storage. Each elevator has a platform 8 ft. x 12 ft., and its capacity is 5,000 lbs., exclusive of the weight of the platform. The motors are on the

second floor and are run by current supplied by the Mutual Light & Power Co.

The accompanying drawing, Fig. 4, shows an end view of the north end of this freight-house, where are located the offices, partly on the first floor and partly on

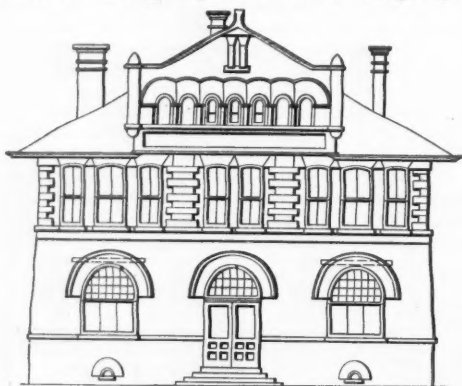


Fig. 4.—Louisville & Nashville Freight-House, Montgomery, Ala.

the second. A portion of the side of the building, facing the street, is shown in Fig. 5, and of the side toward the track in Fig. 6. It will be noticed that the latter consists wholly of doors. The posts between the doors are only 10 in. thick, so that a train of cars, no matter what their length, can always be loaded conveniently without

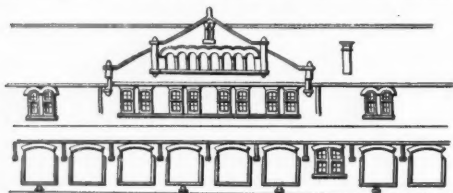


Fig. 5.



Fig. 6.

the necessity of adjusting the doors of the cars to the openings in the side of the house. The doors on the street side are connected with balance weights with Gardner's steel ribbons, 1 in. wide, running over pulleys 8 in. in diameter.

An Automatic Air and Steam Coupling.

The Automatic Air & Steam Coupler Co., of St. Louis, is now introducing an arrangement whereby the air-brake, air signal and steam pipes are coupled and uncoupled automatically at the same time as the cars.

The device, as shown by the illustrations, is attached to the under side of the car coupler, so that there is both vertical and horizontal play to allow, respectively, for variations in the height of drawbars and the wear of the knuckles of car couplers.

Fig. 1 shows two cars in position for coupling. As they come together the flat springs pass between the flaring guides on the opposite coupling, bringing both couplings to the same height and the air and steam openings directly opposite. There are two projecting strips on the face of one coupling which ride on the face of the other until the openings are directly opposite, when the strips drop into recesses in the face of the opposite coupling. The springs act to hold the faces together, and the gaskets at the pipe openings are not in contact until the strips are in the recesses, thus preventing the wear of the gaskets.

The engravings show the attachments used for passenger cars, but various styles of equipment are provided suitable for freight cars, tenders and locomotive pilots, where the air-brake pipes only are coupled.

The steam attachments for passenger couplers are separate and can readily be detached. Provision is also made so that the automatic coupling can be used in connection with the ordinary coupling.

This device has been used successfully in air and signal service for about three years, and with it the hose and pipes are protected, while only about one-half the

length of hose is needed as required for the ordinary coupling.

A full-size model was exhibited at the conventions at Old Point Comfort, Va., which showed the actual working of the coupling with different heights of draw-bars.

Machinery for the Boston Terminal Station.

The contract let by the Boston Terminal Company to Westinghouse, Church, Kerr & Company, is for an unusually comprehensive engineering equipment. The various sections, each of which is complete in itself and yet more or less connected with the others, are as follows:

Switching and signaling; power-house equipment; electric arc and incandescent lighting; elevators and lifts for passenger, freight and baggage service; heating and ventilation; ice-making for car and restaurant use, etc.; refrigeration for restaurant, kitchen and storage boxes; cooling water supply for head-house; car heating in train shed, storage and express yards; air-brake testing; fire protection; disposal of drainage from water-proofed structure; frost protection for roof conductors; steam and hot-water supply for head-house.

The switching and signaling covers a complete electro-pneumatic interlocking apparatus for handling the trains of four railroads to and from the train shed and the suburban trains through the loop. Several hundred levers will be installed for handling the switches and signals—the former being extra heavy, the latter mounted on eight signal bridges varying from 50 to 120 ft. span. The air compressors for the switch work will be in the power-house, as also the electric apparatus for the signal and interlocking control.

The power-house equipment will consist of 10 boilers fitted with economizers and mechanical draft and about 1,600 H. P. of Westinghouse compound engines direct-connected to Westinghouse multipolar generators. The plant will be operated condensing, using salt condensing water from Fort Point Channel, about 100 ft. distant, except when the steam is required for heating. A large switchboard carrying a dozen or more circuits for the various miscellaneous uses of electric current will be provided. A traveling crane will span the engine-room.

The electric arc and incandescent lighting is laid out with especial reference to the character of the service, leading to the employment of a somewhat larger number of distributing centers than is customary in isolated plants, with very complete methods of switching, in order to meet the demands of the lighting and motor circuits, also to aid in economizing power. In addition to the usual wiring conduits, extra ones are added for miscellaneous wiring for other purposes and also for telephone service within the property.

The elevators and lifts for passenger, freight and baggage service comprise 19 electric elevators, several of which are for passengers, distributed in the head-house; two for handling the supplies for restaurant and miscellaneous purposes, while the remainder are special baggage and express elevators for handling the baggage and express trucks from the train shed to the subway

bination of the direct and indirect method, with hot blast and tempered air furnished by fans driven by electric motors, while the ventilation is assisted by exhaust fans also driven by electric motors, with separate exhaust systems for the sanitariums.

Ice-making for car and restaurant use comprises a 20-ton ice plant. The refrigerating plant for restaurant, kitchen and storage boxes is of the usual form installed by Westinghouse, Church, Kerr & Company and is to be erected in connection with the ice plant. Cooling the water supply for the head-house is an adjunct of the ice and refrigerating plant and is arranged to filter and cool water under city pressure, distributing the supply

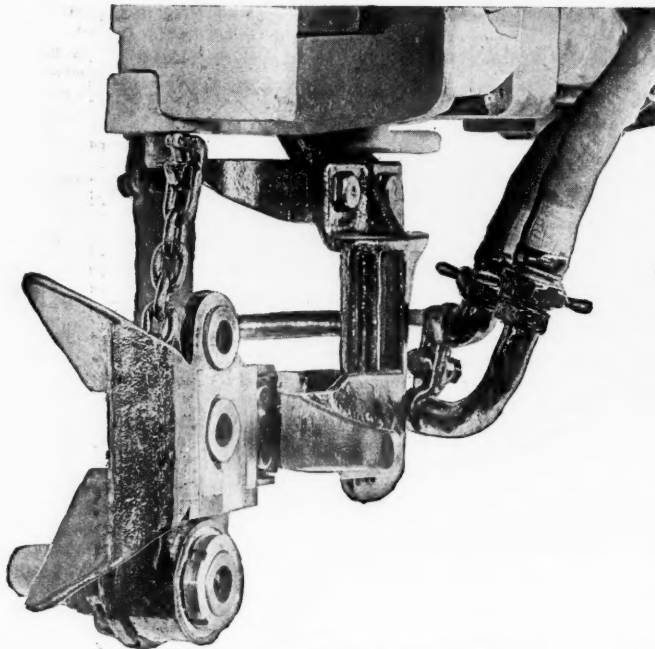


Fig. 2.—Automatic Air and Steam Coupling.

to some 25 taps to give constant supply of pure cold water, in lieu of the more or less untidy and often foul ice-coolers, such as are frequent in public places.

The car-heating in train shed, storage and express yards covers an extensive system of steam-piping, extending over about 40 acres of tracks, for heating cars in all locations where they may be detached from the engines.

For air-brake testing compressed air is carried to the 28 stub tracks in train shed and to nearly as many more in other sections of the yard, with the proper appliances for testing the air-brakes on cars preparatory to sending out trains. This feature will be unusually complete.

For fire protection of the head-house and wings suitable service mains and distributing lines served by the high-pressure fire service mains of the city of Boston are provided with a large number of outlets fitted with hose and reels and provision is made enabling special protective apparatus to be added as required.

The disposal of drainage from the water-proofed structure involves somewhat unusual considerations due to the fact that a large portion of the subway structure is 10 or 15 ft. below tide water, necessitating extensive water-proofing. The grade of the suburban tracks necessarily throws their watershed toward the head-house, and provision is made for taking the storm water of this incline and possible seepage through water-proofing to a sump which is provided with electrical pumping apparatus adapted to automatically keep the water below a certain dangerous level, or in event of an emergency to enable pumps to be put in service to handle large quanti-

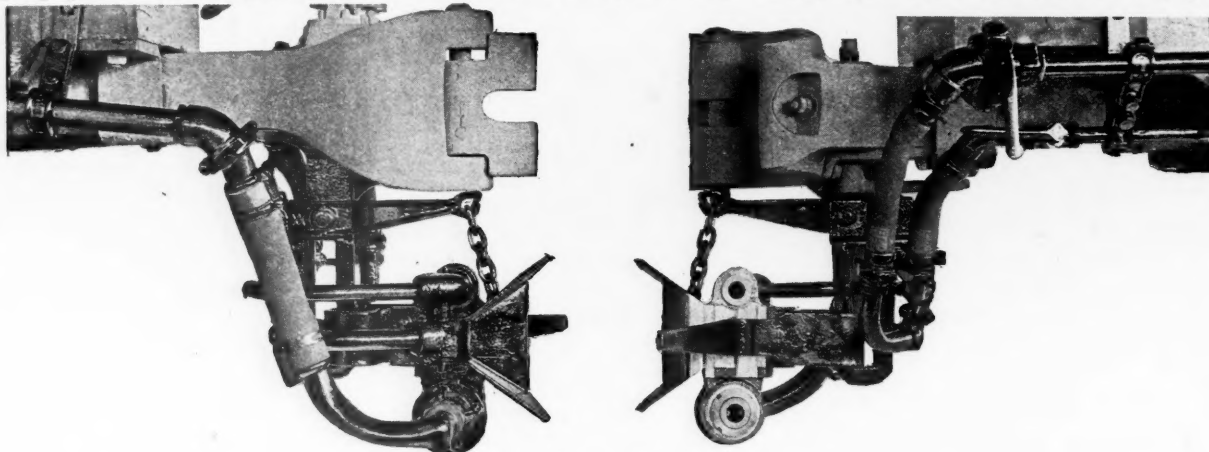


Fig. 1.—Automatic Air and Steam Coupling.

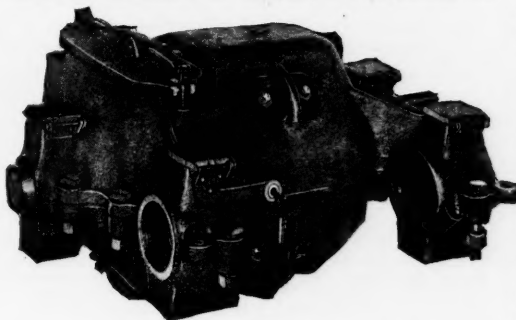
ties of water and avert a rise materially beyond the danger level. The frost protection for roof conductors is important, as there are some 14 acres of roof, the storm water from which is carried to many large leaders.

The steam and hot-water supply for the head-house covers the special all-year-round supply of steam and hot water for miscellaneous purposes, and is wholly separate from the heating system, which is in service only during cold weather.

While differing widely from each other, the various sections above enumerated to a large degree are inter-related in connection with the operation of the terminal as a whole, and many economies, both of cost and operation, have been made possible by the opportunity to design and construct them all as component parts of one complete engineering outfit. As a whole, the Boston Southern Terminal was designed by Mr. George B. Francis, C. E., Resident Engineer, and the Chief Engineers of the New York, New Haven & Hartford, Boston & Albany, New York & New England and Old Colony railroads, while the President, Mr. Chas. F. Clark, and the Board of Trustees have given their special attention and supervision not only to the general features but to many of the details.

New Street Railroad Motor.

The General Electric Company announces a new street railroad motor, of less capacity than the G. E. 1000, but of greater capacity than the G. E. 800. In the nomenclature of its motors the company has abandoned the



General Electric Motor, G. E. 52.

method derived from the drawbar pull and has adopted an arbitrary nomenclature. The new motor is known as the G. E. 52.

It has an output of 28 H. P., rated according to the G. E. standard basis, i. e., a maximum raise of 75 deg. C. in the temperature of the windings after a run of one hour at rated load, the temperature of the surrounding air not exceeding 25 deg. C. The G. E. 52 motor is intended only for ordinary street railroad work and is not recommended for heavier service.

The frame is of steel, cast in two bowl-shaped pieces and practically water and dust proof. A hand hole, fitted with cover plate and gasket, is let into the lower half, directly beneath the commutator, permitting easy access to the bottom of the motor. The motor has four poles, each with its own coil. The pole pieces (and in this feature the motor differs from the G. E. 1,000) are laminated, but are bolted to the frame in the same manner as in the G. E. 1000, the bolts extending through the frame.

The large surface of this motor is one of its most important features. The armature bearings, designed for the use of oil or grease, or both, are of the following dimensions: Pinion end, 7½ in. by 2½ in.; commutator end, 6½ in. by 2½ in., and are constructed on the "out-board" plan. The upper support for the lining is cast with the upper half of the motor frame, and when the lining is in place, there is a space of one inch in the cored recess, between the inner end of the lining and the motor frame. This space is occupied by a combination thrust collar and oil guard. The thrust collar is extended through the motor frame into the recess where it acts as an oil guard. This portion of the collar is a tapered disk, 6½ in. in diameter. The lower support for the lining is a cap bolted to the upper half, but not enclosing the lower half of the oil guard. This allows free outlet to the oil or grease. With this construction it is impossible for the lubricant to work into the motor.

The upper grease or oil cups are of ample size and are provided with wicks or wipers, which wipe the shaft through openings cut in the linings. The axle bearings are also fitted with two wipers to each bearing.

The field coils are wound with asbestos covered wire and "mummified." Each is held in place on its respective pole by means of the pole piece projections, supplemented by a spring steel plate, and is placed in a position before the pole piece is bolted to the frame. For convenience in car wiring and opening for motors, the field connections between the upper and lower fields have been made on the outside of this motor, and both

the field and armature leads are brought out at the front of the motor.

The armature is 11 in. in diameter with a spread of 9 in. The core is built up of laminae, and is provided with three ventilating ducts. The armature is assembled directly on the shaft. There are 29 slots in its periphery, each slot containing three coils formed into a compact unit, consequently there are 29 sets of coils and 87 commutator bars. The small number of coils is of special advantage in the matter of armature repairs, while the method of forming them in groups of three admits of a substantial insulation of high quality. The comparatively small weight of the armature and its consequent small inertia will be appreciated. The standard gear ratio is 4.78 with taper-bore pinion having 14 teeth and a cast-steel gear having 67 teeth. Highspeed gear ratios may be used.

When the motor is mounted on 33-in. wheels, the clearance between the bottom of the motor and the top of the track rails is 5½ in. The clearance between the bottom of the gear case and the top of the track rail is 4½ in. The motor, without gear or gear case, weighs 1,460 lbs.; complete, with 67-tooth gear and malleable-iron gear case, the weight is 1,725 lbs.

Air Compressor for the Atchison Shops.

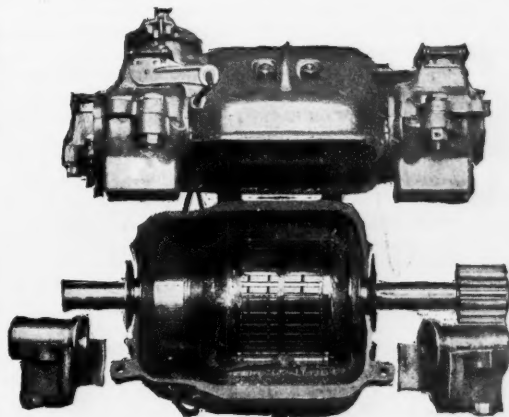
We show an air compressor made by the Ingersoll-Sergeant Drill Co. for the Atchison, Topeka & Santa Fe. Three of these machines have been built for that system; one to be used at San Bernardino, Cal., one at Galveston, Tex., and the other at Albuquerque, N. Mex. They furnish air to drive pneumatic tools and other compressed-air appliances.

These machines embody all the latest improvements; they are the Class "G" duplex cross-compound, steam actuated, with receiver inter-cooler between the high and low pressure air cylinders. High-pressure compounding is a distinct advantage, as it increases the efficiency of the compressor 10 to 15 per cent.

The steam-valve gear of the compressors is of the slide-valve type with Meyer adjustable cut-off. The diameter of each cylinder is 12 in. x 14 in. stroke. The piston inlet air cylinder is 18½ in. diameter by 14-in. stroke, and the high-pressure air cylinder is 11½ in. diameter by 14 in. stroke.

The piston inlet construction admits of an intake box through which air may be drawn from the outside of the building to take advantage of the lower temperature. The air cylinders and heads have water jackets. A special governor controls the speed of the compressor and the air cylinders have an automatic regulator and unloading device which controls the action of the compressor, when the air is used intermittently, and stops when no air is required. It will start the compressor again when necessary, thus using steam only in proportion to the work being done and relieving the engineer

State streets. The plans for this will soon be finished and bids asked for. Since the contracts noted in the *Railroad Gazette*, May 28, were made, the Electric Installation Company has taken the contract for placing the feeders and bonding the third rails; Mr. T. Haley has the contract for the third-rail work, excepting the bonding. Six coaches have been sent to the works of the General Electric Company, at Schenectady, N. Y., where they will be equipped with two 50-H. P. electric motors each, and the Sprague system of motor control. Electric brakes designed by Mr. Frank J. Sprague will be applied. A test of this six-car train will be made on the trial track at the General Electric Works about July 15 to determine the drawbar pull between the cars, the rate of acceleration and the efficiency

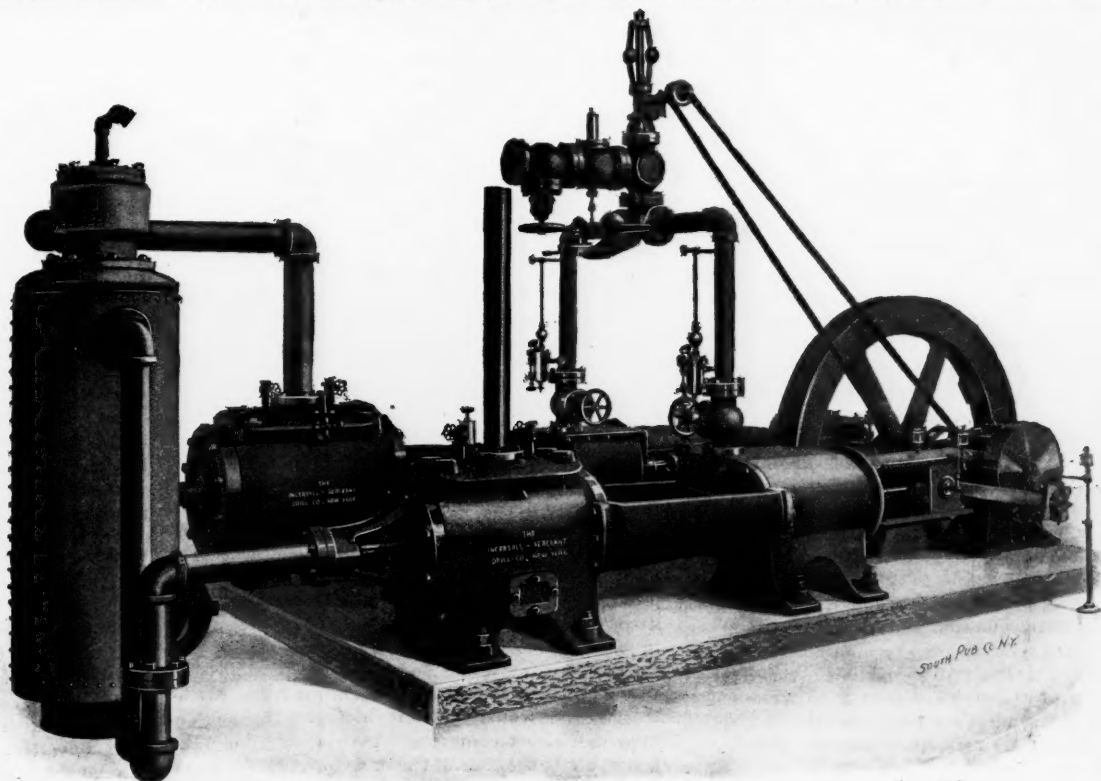


The New General Electric Motor, G. E. 52.

of the electric brakes. The results of trial with this train will form a basis for estimates and will determine whether it is advisable to use the Sprague system. It is expected that trains will be worked on the Alley Elevated by electricity about Nov. 1.

Long Distance Transmission in California.

A contract for the transmission of power of the river running through the Santa Ana Canyon to Los Angeles and Pasadena, a distance of 80 miles, has been concluded between the Southern California Power Co. and the General Electric Co. The amount of power to be transmitted at first amounts to 4,000 H. P. The station will be located in the Santa Ana Canyon, 12 miles from Redlands and about 80 miles from the towns in which the electric power will be utilized. The water will be taken from the river through canal, flume and tunnel along the side of the canyon, where it will be led into a pipe



Ingersoll-Sargent Compressor for the Atchison Shops.

for other duties. These compressors have capacities to furnish about 600 cu. ft. of free air per minute compressed to 100 lbs. gage pressure at a speed of 148 revolutions.

Electricity on the "Alley Elevated," Chicago.

Contracts have been let for all the important work and equipment for changing the motive power of the Chicago & South Side Rapid Transit (Alley Elevated) Railroad, Chicago, from steam to electricity, excepting the power-house proper at the corner of Fortieth and

line 2,200 ft. long, giving what will be equivalent to a vertical fall in the water of 750 ft. The wheels will be of the impact type, directly connected to four generators each of 750 K. W. capacity. The maximum line potential will be 33,000 volts, to which potential the initial voltage will be raised by twelve 250 K. W. step-up transformers. At present the longest line is that transmitting the power of the waters of the Ogden Canyon in Utah to Salt Lake City, a distance of 36 miles. The Los Angeles transmission will be over twice that distance, and three times the distance of the Buffalo-Niagara Falls transmission.



ESTABLISHED IN APRIL, 1856.
Published Every Friday,
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The first two days of the great excursions to California brought news of three collisions of "Christian Endeavor trains," on three different roads, one of them killing two passengers and injuring a score. Everyone at once thought of the disastrous collisions that accompanied the World's Fair rush of 1893, and as the causes of these three collisions were not clearly described in the press despatches, the conclusion was naturally reached by many that these fatal terminations of journeys begun under such pleasant circumstances were the inevitable result of crowding on the railroads more passenger traffic than they are prepared to deal with. This may or may not be the case. In the worst collision, that at West Chicago, the inexperience of an engineman seems from present reports to have been the main if not the only cause. But admitting that freight train men, when put in charge of passenger trains, fail to appreciate their responsibilities and follow blundering theories and trust to luck; and admitting that telegraph operators having to deal with 30 train orders a day will fail to maintain the vigilance that they do with 10 a day; are we to sit down and say that we will have no more excursions? That is a futile remedy, for the passenger agents will continue to employ their present methods of drawing out the stay-at-homes who will not travel except at low rates, and the passengers will be ready to risk their lives if the passenger agent can get the General Manager to risk the expense. So the question comes down to this: Given, an annual rush of enough passenger trains to require all your trainmen, both freight and passenger, how can it be most safely handled? There can be no question on that the substitution of the space interval for the time interval, the perfection of the space-interval method where it is now used under disadvantages, and the multiplication of distant signals, embrace the whole remedy, so far as signals and methods are concerned. Without wasting words to prove a case already proved, we note the point, peculiarly applicable in the aspect of the question now under consideration, that the space interval provides for the safety of all trains alike; a freight train man finds that a larger percentage of the problems which he has to deal with are the same when handling excursion trains as when he is working in his every-day rounds. It does away to a large extent with one of the superintendent's worst bugbears, the doubt about what can be expected of a man when he is taken out of his ordinary routine.

A correspondent sends us the following account of the rear collision on the Chicago & Northwestern:

"Section No. 4 of the Chicago & Northwestern special Christian Endeavor train while taking water at West Chicago, 30 miles from Chicago, about 1 a. m. on Wednesday, June 30, was run into by the section following. Two passengers and a tramp (who was stealing a ride on the front end of section 5) were killed, and 21 persons, including the engineer, were injured. Section 4 was within the yard limits at West Chicago when the accident occurred. The main tracks of this part of the Chicago & Northwestern, outside of yards, are worked by block signals, but the yards are not so worked. It

appears that the engineer of section 5 was a man who has been running in freight service. Instead of entering the yard at reduced speed, as the rules require, section 5 was not under control. It has been reported that the air brakes failed to work, but no evidence has been given to warrant one in crediting the report. A more likely reason is that the engineer miscalculated the weight of the train or the amount of brake power at his command and did not apply the brakes soon enough.

"Similar accidents have occurred on other roads where the main tracks through yards have not been operated in conjunction with the block signal system. This accident is another example of the danger of depending upon 'yard rules' for the protection of trains."

Collisions in yards, where all of the line except the yards is well signaled, have constituted one of the most troublesome class of accidents on English railroads, and the criticism of our correspondent only echoes the view of the British Board of Trade Inspectors, frequently expressed in their official reports. These inspectors have gone so far as not only to demand the establishment of signal cabins at both ends of important station yards, but the maintenance of all the safeguards also, the same as though the two cabins were several miles apart. They would forbid any control of one of the signalmen by the other, and on lines using electric locking, such as the Sykes apparatus, would require its regulations enforced to the fullest extent possible, the same as on the open road. It is true that a collision in a yard is usually far less disastrous than one on the open road, but it is to be remembered that the use of the block system on the open road elevates the standard of safety and thus raises the standard of the requirements that the public imposes upon railroads; so that a yard collision now is as damaging to a company's reputation as a worse disaster would have been a few years ago.

Freight rates on competitive traffic coming under the jurisdiction of the Joint Traffic Association are now said to be all right; they have been "restored." As expressed by one of the presidents in a New York daily paper:

"The action of the presidents in deciding to immediately brace up both the eastbound and westbound situations after spending two days discussing the present conditions, has already had a most beneficial effect and the indications are that rates will be maintained for some time. The recent demoralization reduced matters to a dangerous condition, and opened the eyes of the presidents. The necessity for immediate action became imperative and there is now little doubt that there will be a stricter adherence to the tariff than there has been for some time. The situation is now decidedly good. The all-rail situation has been preserved, and similar action taken by the lake lines makes the rate situation east of Chicago better than it has been for several months."

All of which sounds precisely like the talk that we used to hear before we had the Joint Traffic Association, or any thing of the kind. New York was formerly supposed to enjoy a more bracing (traffic) climate than the cities of the wild West, but this "interview" sounds exactly as though it had been uttered in Chicago. As the Joint Traffic presidents are honorable men, it must be assumed that they have all found some way to "shade" rates so as to satisfy importunate shippers without going through the formality of getting a vote of their respective boards of directors; for any such vote would have to be reported to Mr. Blanchard or to the managers. How this can be done will be told, probably—sometime. Meanwhile, with the shadow of a possible adverse Supreme Court decision hanging over them, the managers of the Joint Traffic Association, with its excellent 15 months' record, seem to be in just about the same situation as that of the administrative officers of any ordinary rope-of-sand association. But while the Joint Traffic Association seems to be degenerating to the Chicago level, the Western roads seem to be building great hopes on the fact that the Eastern concern is as good as it is. While they themselves have thrown up all their agreements and have professed great fear of the anti-trust law, they keep right on, according to the newspapers, in the business of making agreements of all sorts; and we must conclude that the possible legal validity of the Joint Traffic Association is the earth-work behind which they are hiding. If, now, the Supreme Court comes out, two or three months hence, about the time of the first frost, with a decision squelching all associations, where will these agreement-makers be? It is true that most of the agreements are somewhat conditional and many of them oral and informal; some are highly commendable, as, for instance one to restore demoralized rates, or to refrain from dealing with ticket scalpers; but all are repugnant to the anti-trust law and, so far as we can see, the accumulated penalties now hanging over the heads of Chicago traffic officers must amount to about a thousand years' imprisonment!

From signs already manifest the soft-coal strike is likely to be remarkable from several points of view. Mine operators and the transporting companies have

worked themselves waist deep in the mire in competition for business or tonnage. They have lost sight of profits, and in many cases have taken business at a loss. As a result, contracts covering future deliveries, in some cases as far ahead as 1898, have been made at very low prices. In the tidewater territory the operators on certain of the lines agreed to deliver coal during 1897 at prices equivalent to \$1.20 Philadelphia. At the time of booking this figure was approximately the published freight rate to tidewater. Subsequently certain of the railroads raised the net rate and hung up the operators and others have threatened to do so. The situation is similar in the Lake region, with the additional complication that Pittsburgh has, since last fall, maintained a mining rate of 51 cents, or a figure as low as the Ohio operator could get the great body of their men to agree upon. Owing to the superior quality of Pittsburgh coal, the ease with which it is mined, and the fact that a 1½-inch screen is used against a 1¼-inch screen in Ohio, there is a natural differential of 9 cents in favor of Ohio. Unless the Pittsburgh operator pays 60 cents the Ohio operator cannot hold his markets. In fact, in 1893 Pittsburgh had 50 per cent. of the Lake trade. In 1895, it commanded 62 per cent. This gain of 12 per cent. was at the expense of Ohio. Complete data for 1896 are not available, but it is said that the gain of the Pittsburgh region was steady during the period. Pittsburgh operators have increased their tonnage but not their profits; Ohio operators are losing money and tonnage; the tidewater interests are holding tonnage, but very few are making a profit and some are losing, and on top of all this is the fact that the future of most interests is mortgaged months ahead. It would not be surprising should the strike be regarded with more or less favor; operators look upon it as about the only measure to restore equilibrium, and it will release many from delivering coal on contracts. The majority of railroad lines east of the Mississippi River, and not a few west, are likely to suffer. The roads of the country consumed about 30 per cent. of the soft coal used in 1896, the bulk of which came from the regions which are, or which are likely, to become involved, and there has been little opportunity for stocking, as the notice was short.

The Status of Electric Railroading.

The man who watches human affairs with a little memory and some sense of proportion, and who keeps his bearings cool, can find a certain entertainment in the frequent "relegation of the steam locomotive to the scrap heap" by the electric motor. For four or five years we have had detailed statements of hundred-mile-an-hour railroads and 200-mile-an-hour railroads between Chicago and St. Louis, or New York and Chicago or New York and Philadelphia. Circumstantial statements have been published year by year for five years as to the electrifying of the Chicago end of the Illinois Central, the Boston end of the Consolidated and the Philadelphia end of the Pennsylvania Railroad. Within a few months all of the railroads reaching New York have been on the eve of abandoning the steam locomotive for their suburban travel at least. Several transcontinental railroads have been reputed to be on the point of equipping their heavy grade divisions for electric working any time the last four years.

But in reality what has happened? On the Nantasket Beach Branch of the New York, New Haven & Hartford there are 10.4 miles of railroad formerly worked by steam locomotives now worked by electricity. On the same road between New Britain, Conn., and Hartford there are 12.3 miles and on the Mt. Holly branch of the Pennsylvania Railroad there are 7 miles worked by electricity which were formerly worked by steam locomotives only. Aside from these cases we cannot think of a foot of steam railroad, using the term in the general sense, which has been converted to electric railroad working. In saying this of course we do not take account of some steam dummy lines in and about cities which have been converted, nor of the Lake Street Elevated and the Alley Elevated in Chicago. Thus, out of about 184,000 miles of railroad some 30 miles have been converted to electric working, and more than half of this is experimental. The Nantasket Beach Branch and the Mt. Holly Branch were and are avowedly experiments, established at considerable cost for the purpose of studying the subject in practice. The New Britain-Hartford installation was probably established to head off trolley competition and may be regarded as a genuine case of converting a steam line to electric working for business purposes.

From all this it does not follow that we are not on the eve of a revolution. Perhaps we are, but it is evident that the men who are responsible for the finan-

cial results of administering the great railroad properties entrusted to their charge are looking at the possible change with very proper caution.

About five years ago Mr. George Westinghouse wrote to the *Railroad Gazette* that the central station plant to generate, and the motor to use, 1,200 H. P. (leaving out the cost of the conductor) would cost about eight times as much as a locomotive of that power, and he said, "I feel confident that the above figures, or any modification that may be reasonably expected, will be a most serious obstacle to the utilization of electricity for moving standard railroad trains." This simple and compact statement of a controlling physical fact had a great effect on the discussion. The critical point of the whole matter was set out alone, and no one of enough sense to carry any weight could help seeing it. Gradually all competent electrical and steam engineers came on to the same ground, and recently we have heard of the wholesale conversion of steam railroads only from ignorant enthusiasts or reckless promoters. So lately as a year ago one of the foremost of the young electricians, Dr. Louis Duncan, said; "As far as the present steam railroads are concerned it is doubtful whether the increased earnings which would follow the building and equipment of such an electric railroad would pay them for the great expense of it."

Three years ago Mr. D. L. Barnes said: "The first cost of central station plant and conductors for long line work is so great per mile of track as to deter any steam railroad company from making an experiment of changing a large steam locomotive plant to an electric plant at present. . . . There will no saving in cost of fuel when the same kind of coal must be used in the stationary plant as is used for the steam locomotive. . . . No railroad company should undertake the substitution of electric motors for steam locomotives without the most searching inquiry."

It must be kept well in mind that Mr. Westinghouse five years ago, and Dr. Duncan a year ago, and several of us who have said the same thing in different language in the interval, were talking of the general substitution of electricity for steam. We have all recognized that there were places where even mechanical extravagance was justified for ends of commerce or strategy. And serious mechanical extravagances have been committed.

But is the electric art to-day the same as it was five years ago or one year ago? Are we justified in saying that in the state of the art at the end of June, 1897, we cannot foresee an important and extensive replacement of the steam locomotive by electric motors? Or has the art so advanced within the last four years that to-day we are justified in saying that within the next decade many miles of railroad now worked by steam will be worked by electricity? Prof. Trowbridge lately wrote a volume under the title: "What is Electricity?" The sum of his answer is that he does not know. We shall not write a volume to tell part of what we do not know about the present status and the immediate prospect of electric railroading, but a little review of the situation as we see it to-day will at least be suggestive of the immediate future.

The recent experiments on full-sized specimens, in actual work, have demonstrated some things which four or five years ago were still in doubt. They have shown, for example, that it is not only possible, but easy to collect large quantities of current at high railroad speed. The difficulties foreseen, of collectors jumping off, or of the surfaces fusing, are not encountered.

These experiments have shown, too, that current can be taken from a rail laid along the ties as well as from an overhead wire; although we never understood why there should have been any doubt about this. They have developed and tested trucks capable of carrying heavy motors and cars at high speeds, but no intelligent mechanical engineer had any doubt that such trucks could be built when they were wanted. In brief they have advanced the art, but they have not answered the questions that were raised several years ago. They have not developed a method of transmission that is so safe and so simple that it is available for ordinary railroad working on the open line and in the crowded yard. They have not shown that a unit of traffic work can be done as cheaply, except under peculiar and limited conditions, by electricity as by steam. Mr. Clark's courage and energy, and his resolute grasp on the vital questions of the future, have cleared away a good deal of underbrush, but they have not graded or paved or even staked out the high road.

We estimate that the "third-rail system," as now developed, is not and cannot be a practicable mode of carrying current for ordinary railroad working. Around yards it would be intolerable. The complications among the switches, frogs and signals would

alone kill it. But the danger to life is still a greater objection; it would never answer to cover the ground with a network of conductors liable to knock a man down in front of a switcher. Out on the open line the danger is still great, but, of course, less than in yards; and one can imagine fairly cheap and efficient ways of protecting the conductor. Beyond these great and sufficient objections are those of liability to short circuits from fallen brakebeams or other like causes and loss of current from leakage. Concerning all this we do not wish to seem to speak dogmatically, and we shall welcome any demonstration of the errors of our opinions; but until enlightened we have to hold these opinions.

Again, no figures of interest, repairs, fuel, attendance and results in work have ever been published that upset the opinion which we still hold that the work done on these experimental lines up to date could have been done cheaper by steam power. We do not say that on Nantasket Beach, for example, a steam dummy service would have attracted as many people; but that, counting interest, it would have been cheaper per passenger-mile than the electric service. We do not say that the Hartford-New Britain situation (commercial and strategical) could have been met by any modification of the steam service; but we suspect that the work actually done could have been done cheaper by steam.

Have we come then to some set of physical limitations which must still, for years, block the way to the general use of electricity as a railroad motive power? Or does the present state of the art suggest that we may expect soon to see a long step ahead?

On the whole the outlook has changed within two or three years. In fuel, for example, Mr. Westinghouse has been foretelling great economy through the gas engine. To-day he is more confident than ever, and a 750-H.-P. engine has been designed and is actually under construction at East Pittsburgh. Designs and estimates for producing plant are under way; and from careful studies of the work of engines up to 250 H. P., and of the data on cost of plant so far gathered, it is estimated that from one-half to two-thirds of the cost of generating electric power can be saved by gas engines. The fuel economy of the gas engine has been proved by many tests; but the difficulties of controlling gas engines, especially in large units, and their first cost have restricted their use.

Further, the electro magnetic (modified Wheless) system of carrying current has now been tried at East Pittsburgh for two or three years in the actual work of the shops and yard, and the results have been such that the Westinghouse company is, we believe, now ready to offer this as a practical system. A modification now in experimental service is with two conductor rails, one for the working current and one for the return, instead of the pins or plates. The conductor rail is cut in and energized essentially as the Wheless buttons are, and the energized sections can be of any length according to local conditions. In yards, or other greatly exposed places, the active rail can always be covered by the passing motor car; out on open line, on fenced right of way, it may be 3,000 yards long, more or less, as is found cheapest and best. This rail is fed by a feeder cable that can be disposed and insulated as is most convenient and efficient. It is obvious that the most serious objections to the live third-rail, the complicated overhead trolley wire and the costly and complicated underground trolley disappear with this construction.

Finally, Mr. Westinghouse thinks that he has at last achieved the long-sought, variable gear motor. Or, more accurately, he does not attempt to overcome the great difficulties of a variable gear, but he has made a motor with two gear ratios, by which he expects to accomplish much of that which could be accomplished with a strictly variable gear and yet to have a motor of practicable simplicity, weight and cost.

It is probably not necessary to tell the reader that an electric motor wound for a high speed is very inefficient at low speed. By the introduction of a gear which will permit the armature shaft to run fast while the driving axle is running slow we get a motor which is efficient and will give a heavy drawbar pull at starting and in acceleration.

Naturally, we express no opinion as to the present perfection or the future utility of either of these three elements of electric railroad working in which Mr. Westinghouse believes that he has now made a distinct and useful step forward. Such an opinion, to be of the least value, must rest on profound and thorough study of many things; in other words, it must be the sort of opinion for which people have to pay heavy fees. A gratuitous and easy opinion would be mere impertinence. All that we aim to do is to call attention to some of the things that are now

in sight to indicate that the electric railroad art may be on the eve of important changes in methods.

To sum up: The cases in which electric hauling has taken the place of steam, on railroads heretofore worked by steam, are important in themselves, but relatively they are insignificant. From our review it seems that further great progress in this substitution imposes certain well-defined conditions: (1) The electric current must be generated cheaper. A great part of the interest on the cost of the power and transmission plant must be saved at the coal pile. (2) If the current is used more efficiently at the motor there will be a saving in cost of transmission as well as in cost of generating. (3) A further economy may be reached in cost of transmission. (4) Some mode of transmission must be developed that is at once safe enough and simple enough to use in yards and terminals. Whether or not the art is now advanced to the point of meeting these conditions remains to be proved to the satisfaction of those who are responsible for the economy and efficiency of railroad working.

Compressed Air and Electricity at Port Chalmette.

We have great confidence in the good faith and good judgment of the gentleman who writes the account of the Port Chalmette enterprise printed on our first page; and it is obvious that he is a good observer. We cannot agree with him, however, that the economy of the electric haulage as "compared with compressed air has been proved beyond a doubt" at Port Chalmette. The conclusion that the work is done cheaper by electricity is not warranted by the facts presented. It may be correct, but we want more evidence.

For instance, the statement that the cost of maintaining track under the compressed-air haulage is much greater than under electric haulage is, we suspect, theoretical. An experience of about a year with one and half a year with the other, on new track, is not enough to justify so broad a conclusion. If all the details of expenditures on maintenance of track and machinery, of interest on cost of machinery, of fuel and wages account, and of work done could be gathered, analyzed and compared, the result would be instructive and highly interesting. Until we see such details, however, we suspend judgment on comparative economy.

Concerning the experience with the compressed-air plant we have some information from another source. The first two air locomotives were furnished by Messrs. H. K. Porter & Co., and were shipped in October, 1895. A third, with greater tank capacity, was shipped in August, 1896. The compressor was furnished by the Norwalk Iron Works. The pipe line was bought and laid by the railroad company, and we understand that the builders of the motors and compressor had nothing to do with the plan of the installation, the capacity of the piping or the arrangements for storing and charging.

Obviously there were a number of things to be coordinated to get good results. The work of the motors in speed, frequency and loads, the capacity of the compressor, the storage capacity of the pipes, and the points of re-charging should all have been considered. With the work in sight at the outset the first plans were probably good enough. Each motor was expected to make a round trip every half hour and to re-charge directly at the compressor; there were two motors and they charged to a pressure of 600 lbs. per square inch. But the tonnage to be handled quickly developed so as to require three motors, making more frequent trips. For prompt, efficient and economical service there should have been storage capacity enough to equalize the pressure in the motor tanks instantly, or practically so, when connected with the pipe line. There should have been pipes and connections so distributed about the yards and warehouses as to minimize the unprofitable engine mileage in running to and from the charging places. The compressor should have had ample capacity for its work. The fact is that the only provision made for storing air was 1,542 feet of 5-inch pipe which gave less than one-quarter the volume of storage capacity necessary to get prompt equalization in the motor tanks. Most of the charging had to be done direct at the compressor, which took anywhere from 12 to 18 minutes and the compressor did not have capacity to supply air to the three motors at the intervals required.

It is not surprising, therefore, that the compressed air hauling was unsatisfactory, or that, as we have been told, the motors "lay down out in the field." It would not be surprising, further, to learn that the hauling under these circumstances was costly. Engine crews lost time while running to and from the charging station and while charging from the compressor, and the engines made a heavy percentage of

empty mileage. Under all these contrary conditions it would have been surprising if the compressed air hauling had not been expensive.

On the other hand, the former Chief Engineer and General Manager, who planned the work and started the compressed-air haulage, writing to *Compressed Air*, says: "During my management these pneumatic locomotives gave entire and complete satisfaction. These electric motors have about one-third of the hauling capacity of the pneumatic locomotives, and are more expensive on account of the fuel consumed, and have the ever-present danger of sparks in a cotton yard."

But the difficulties and inefficiencies developed later with the compressed-air haulage have nothing whatever to do with compressed air. They, or others quite as great, would arise with any other system as inadequately planned. We do not understand that the Chief Engineer and General Manager, under whose direction the original air plant was installed, is responsible for its inadequacy. We judge that came about chiefly because there was more work to do than had been anticipated. On the whole, from such information as reaches us, this cannot be looked upon as in any way a satisfactory or conclusive test of the relative economy and efficiency of hauling by compressed air and by electricity.

There is still another consideration which we have never seen satisfactorily dealt with. This place happens to be one where the fire risk is especially great. The principal business is hauling cotton and the decks of the wharfs and like places are covered with lint. One would say that an electric motor would be considerably more dangerous than a steam locomotive in such a place. Great care must be taken to prevent sparking and the danger of starting fires by sparks must be constantly great. We have been told that the contract with the electric company requires that there shall be no sparking and that all rails shall be kept clean at all times, which seems rather a hard condition to carry out. We have indirect information that the motors have really started several fires. On the other hand, our correspondent, who is and has been on the ground in a responsible position, says that there have been no fires attributable to the electric motors. To his testimony, being direct and positive, we must give great weight, but we should say that the immunity must have been secured at great cost in care and vigilance, and we should be very apprehensive of the result if the electric plant were under a management less skillful and faithful.

Over 50 years ago the Dublin, Wicklow & Wexford Railroad, which serves the suburbs lying south of Dublin, was the scene of an important experiment in atmospheric traction. Brunel was a firm believer in the new motive power. Robert Stephenson wrote an elaborate and unanswerable report demonstrating its impracticability, and, as all the world knows, the hard-headed Northumbrian was right. In this matter, as in so many others, Brunel's imagination had overpowered his judgment. The Dublin, Wicklow & Wexford is now the scene of a fresh experience, common enough in the United States, but new in the United Kingdom. It is losing the bulk of its suburban passenger traffic through the competition of an electric trolley road. Last half year's report stated that there was no dividend for the ordinary shares and only half a dividend for the preferences. But it stated also that the tramways were limited by law to eight miles an hour; that this speed had been in fact much exceeded, and that the Board of Trade was to be appealed to to prevent an illegal competition. It is difficult to imagine that the inhabitants of Dublin, having experienced the advantage of a fast service, will consent to go back to the pottering five or six miles an hour with which English towns, which have never known anything better, are apparently content.

Thirty years back a Parliamentary committee gave a famous decision as to the limits of permissible competition between railroads. The Great Northern then, as now, derived a large part of its income from the carriage of coal from the West Riding coal field to London. A rival company promoted a new line, and in support of its application gave evidence that its gradients would be so favorable, and its expenses consequently so low, that it would be able to reduce considerably the existing rates, and, therefore, to cheapen coal to the London consumer. On this evidence the committee threw out the bill, holding that the old company could not afford to carry at the proposed rates, that it would consequently be ruined by the competition, and that against such competition it was entitled to be protected by the authority of the Parliament to which it owed its own existence. The principle of this decision has lately received fresh sanction. The Highland Company owns some 500 miles of line in the barren districts of the north of Scotland. The bulk of them hardly pay working expenses. The main line, however, from Inverness to Perth and the South, on to which traffic converges in something like train load quantities, is at least relatively profitable. Two rival companies proposed to divert a large share of the traffic from Inverness to the South to a new alternative

route, along which a line was certainly required for the accommodation of local needs. The Highland company pledged themselves to make this line and work it efficiently as a local branch, provided their Inverness-Perth traffic was protected from the competition of a new through route. If that traffic had, said they, to be shared with a rival, the resources would be so crippled that they would cease to be able to serve efficiently the unprofitable territory in the extreme north where no rival company was ever likely to desire to intrude. And Parliament listened to this appeal of the Highland company and accordingly rejected the two rival bills.

The Atlantic City Railroad (the Reading's line from Philadelphia to the sea coast) has put on an express train to run from Philadelphia to Atlantic City in one hour, including the ferry transfer. From Camden, on the east side of the Delaware River, the starting point of the train, the distance is 55½ miles and the scheduled time is 52 minutes, equal to 64.04 miles an hour. On July 2, the first day, the trip was made in 48 minutes, equal to 69.37 miles an hour. There was a heavy thunder storm during the trip, making the rails somewhat slippery and necessitating a reduction of speed at some points, because the view ahead was not clear. The train consisted of five cars, weighing 320,300 lbs., and the engine was No. 1027, a Baldwin compound, Atlantic type, which was described in the *Railroad Gazette* of June 19, 1896. This engine has a Wooten firebox 8 ft. wide and 9 ft. 5½ in. long. The cylinders are 13 in. and 23 in. x 26 in. and the driving wheels are 84½ in. in diameter. The heating surface is 1,835 sq. ft.; total weight of engine, 143,000 lbs., and weight on drivers, 78,600 lbs.

Railroad managers will be interested in a decision recently handed down by the Supreme Court of Pennsylvania, setting aside a "guess" verdict. Plaintiff's intestate was found between the tracks, unconscious and horribly mutilated. He died within a few hours without having regained consciousness. In a suit against the company for damages, it appeared that the accident occurred at a grade crossing, some time during the night; that the company maintained gates and a man to operate them during the daytime, but that during the night the gates were unattended, there being no other warning than the usual display of red lantern lights. The jury returned a verdict, in a round sum, against the company, which, on appeal, the Supreme Court has now set aside in an opinion of exceptional vigor. The court held that although the road might be negligent in guarding the crossing, it cannot, in the case of one found on the track in the vicinity of the crossing, be presumed that this neglect was the cause of his death, or that he was lawfully on the crossing. The Court further says that, even going to the extent of assuming that the company was negligent in not keeping a night watchman, or in not maintaining a sufficient light, there must be evidence that this negligence was connected in some way with the injury, so as to afford a presumption that it was the proximate cause of death. A presumption, however violent, must be based upon some fact. It is not sufficient where it is grounded upon some other presumption. There was no evidence whatever to show how the deceased came upon the tracks, or how, when once there, he received his fatal injuries. He may have been placed there by murderous hands; or have wandered there in a state of gross intoxication, or fallen from some passing train. And in the sententious language of Mr. Justice Dean, who wrote for reversal, "The verdict had no better foundation than a guess." If we could have decisions of this character a little oftener we might hope that they would discourage the originators of the flood of trumped-up suits that make the railroad lawyer's life a burden. The case in question is entitled *Welsh v. Erie & Wyoming Valley*, and deserves more prominence than it is likely to receive.

The decision above referred to, from so eminent a court of last resort is encouraging. If some statutory bill of costs could only be imposed upon the fake lawyers who bring these contingent-fee suits, it would be a good thing and perhaps kill out this species of vampire that is batten on the courts. The courts would welcome such a law more even than the railroads, as they are the principal sufferers in every way except in the matter of dollars and cents. Any regulation that would fasten upon the plaintiff a reasonable degree of liability in the event of failure to sustain his cause would rid the court calendars of many tedious and vexatious suits. If an injured party really had a meritorious cause of action, he could, even if poor himself, find some one to go on his bond. And if his cause were without merit, a shyster would have no encouragement to sue in his behalf because he would be foredoomed to be beaten and his bondsman would get stuck.

Hon. John E. Sanford, Chairman of the Massachusetts Board of Railroad Commissioners, has been renominated by Governor Wolcott for a term of three years. The question of the confirmation of this appointment will not come before the Governor's Council until a week after the announcement of the appointment, and, meantime, E. Moody Boynton, the Bicycle Railroad man, has protested against confirmation, alleging that Mr. Sanford has not treated him fairly. Two or three years ago, when one of Mr. Boynton's visionary enterprises was before the Railroad Commission, Mr. Sanford was obliged to call Mr. Boynton to order at a hearing before the Board, and he seems to lay upon the Commissioner the chief

blame for the failure of his various schemes for conferring untold benefits upon the public. If the Governor does not heed the present protest Mr. Boynton threatens to try to have Mr. Sanford impeached. The Boston Quincy & Fall River Bicycle Railroad, recently authorized by the Legislature, will soon appear before the Railroad Commission for the approval of its organization, and Boynton evidently fears that his project will be subject to some pretty searching inquiry if Mr. Sanford sits as Chairman of the Board at the hearing. Another project of Boynton's is for a single rail railroad from Exeter, N. H., to Amesbury, Mass., but there does not seem to be any prospect that it will be built. The territory through which it is proposed to build the line is very thinly settled.

The Interstate Commerce Commission announces that the hearing on the application of the New York Produce Exchange for a readjustment of the rates on grain from the West to the Atlantic seaboard, which had been appointed for June 29, has been indefinitely postponed. Some of the reporters add that the matter will probably be taken up in the fall, but others claim to have ground for believing that the present action indicates a decision on the part of the complainants to drop their case entirely. Whether this is so or not, it seems to be the view of a good many people that the problem of adjusting the differentials as between the rates to New York and to the ports competing with New York—Boston, Philadelphia, Baltimore and Newport News—is so very complicated that almost any argument that the partisan of one city may take up is about as likely to help his opponents as himself. The grain dealers of Boston are particularly gratified just now at what they look upon as the failure of the attempt of the New Yorkers to get a change in the rates. Every time that New York has said a word about the injustice of allowing a differential to Philadelphia or Baltimore, the Bostonians have appeared with their claim that New York should not have a differential as against Boston.

Most of those who are watching closely the development and introduction of metal car trucks are of the opinion that for cars now in service metal bolsters will be substituted for wooden trussed forms, leaving other parts of the truck unchanged; also that metal bolsters in connection with the present trucks will precede, but eventually give place to, the special designs of steel trucks. In other words, the metal bolster will form the connecting link between present practice and the general use of metal trucks proper. The chief reason given for this opinion is that railroad business is not sufficient to warrant the expenditure necessary to equip cars now running with modern trucks although there are few mechanical men who do not recognize and appreciate the advantages. For new car work, where the first cost is not too great an object, there are many things which favor the use of specially designed steel trucks. This is about the only field which is now open to steel truck manufacturers, and with the few cars being ordered it is not a wide one. It is interesting to note that the Atchison, Topeka & Santa Fe is replacing wooden trussed bolsters on 40,000-lb. and 44,000-lb. cars with cast steel bolsters, and applying M. C. B. 60,000-lb. axles and oil boxes. The marked capacity of the cars so fitted is then changed to 50,000 lbs., increasing the capacity 25 per cent. for the 40,000-lb. and about 15 per cent. for the former 44,000-lb. cars. This work is only done when the cars have extensive repairs. Other roads have adopted similar methods for purely economical reasons.

NEW PUBLICATIONS.

Roofs and Bridges, Parts I. and II. By Mansfield Merriman, Professor of Civil Engineering in Lehigh University, and Henry S. Jacoby, Associate Professor of Civil Engineering in Cornell University. New York: John Wiley & Sons, 1896 and 1897. Part I., fourth edition, 8 vo., 183 pages, with index; Part II., third edition, 8 vo., 234 pages, six plates and index. Price, each, \$2.50.

It will be remembered that Part I. and Part II. treat of the determination of stresses in trusses and other structures by analytical methods and by graphical methods respectively. These editions differ in several particulars from the corresponding previous ones. The blank pages formerly inserted for the convenience of the student have been omitted and three chapters added to each volume, the size remaining about the same. Chapters II. and III. of Part II. have been rewritten and enlarged, and articles are given on the determination of stresses in what are classed as "ambiguous cases," or trusses where the stresses cannot be obtained by usual methods, as in the case of the unsymmetrical Fink truss. Moreover, these are the first editions of Parts I. and II. that have been brought out conjointly by Professors Merriman and Jacoby.

In Chapter IV., Part I., the first of the new matter, several structures not given before are considered. Among these are a cantilever arm, a crane truss, a simple draw-bridge, a trussed bent and a trussed tower. The advance of the bicycle upon civilization is here made manifest, as an article is devoted to the calculation of the stresses in a bicycle wheel with tensile spokes. A Ferris wheel with tensile spokes is also considered.

A discussion of deflection and the principle of least work is given in Chapter V., which gives a good elementary idea of the subject. To illustrate the application of the principle of least work the stresses in three strings supporting a weight are calculated, one of the strings being vertical and the other two inclined. A Ferris wheel with stiff spokes is another case considered. This is also

a case of redundancy, for it will be impossible to state as many static conditions as there are unknown stresses. A bicycle with stiff spokes is another example given. These wheels are similar to those before mentioned and it is shown that for the Ferris wheel with stiff spokes the maximum stress in the spokes is only one-half as large as for the corresponding wheel with tensile spokes and the maximum stress in the rim only one-third as large. The stiff spokes are, however, subject to equal strains of tension and compression, so that the range of stress in each case is the same. The segments of the rim of the stiff spoke wheel are also subject to equal tension and compression, so that the range of stress is two-thirds as large as for the wheel with tensile spokes. For the bicycle wheels it is not possible to give a general comparison between those with tensile spokes and those with stiff spokes, for in the latter all the stresses depend upon the ratio of the areas of the cross-sections of the spokes and rim. The range of stress in the spokes, however, is the same in each case where the loading is the same, but the stresses in the segments of the rim will always be considerably less in the wheel with stiff spokes. From the foregoing it will be seen that if a compression member could be made as economically as a tension one, the wheels with stiff spokes would be the better construction.

The final chapter is a brief history of the evolution of bridges, and a number of trusses are mentioned and the causes shown why they have been abandoned or are still in use. The principles of design which have been introduced and which have survived, being used in modern trusses, may be briefly mentioned: First, the panel system; second, counter-bracing the panels; third, making the compression members as short as possible; fourth, varying the depth of the truss to make the stresses as nearly uniform as possible; fifth, the methods of suspending alternate floor beams without the use of a double system of bracing, and, lastly, the combination of all these good qualities.

In Chapter V. of the Graphic Statics a discussion of trusses with broken chords is given, all possible conditions of loading, including the effect of wind, being considered, and both maximum and minimum stresses determined. In the following chapter various modern trusses are considered, among these being the Pegram, the Petit and the Greiner. This latter was designed by J. O. Greiner, Engineer of Bridges of the B. & O., so as to be adapted to the use of old rails and material taken out of old bridges. A full description of this truss was given in the *Railroad Gazette* of Sept. 13, 1895. The Ferris and bicycle wheels are again taken up at greater length, the changes of stress that occur as the wheels revolve being discussed, and also the stresses produced in the Ferris wheel by unequal loading.

The remaining chapter, Chapter VII., treats of the elastic deformation of trusses. It is first shown how to construct the displacement diagram or the graphical representation of the displacement of a panel point caused by the elongation or shortening of the members meeting at the point. The deformation of an entire truss may then be obtained, and subsequently its deflection.

The new chapters contain some interesting additional matter. While most of this is of an elementary character, it must necessarily be so, the book being intended for those taking up the study of stresses for the first time, and for such purposes it cannot be too highly recommended. We should be disappointed, however, that more space is not given to more complex structures, such as drawbridges and arches, were it not that a full discussion of these is said to be reserved for Part IV., which we are informed will be published this year.

Modern Freight Car Estimating. Containing necessary information and tables appertaining to the proper method of compiling correct estimates on freight equipment. Edited by O. M. Stimson, Anniston, Ala.: Stimson & Co., 1897. Octavo, 510 pages, with index, engravings and folding tables; flexible morocco, gilt. Price, \$5.

The purpose of the editor in compiling this book has been to bring together in a compact and available shape the information which a man must have in order to prepare accurate estimates, and accuracy is of the last importance in a matter where a small error may make the difference between profit and loss. But speed also is important in preparing estimates, for it often happens that the time for bids is quite inadequate for a proper collection and compilation of figures, particularly where ambiguous drawings and specifications have to be considered. For the purpose of accuracy and of speed it will be a great convenience to have brought together tables of all materials and parts, giving numbers, weights, dimensions and in fact everything but the prices, which must vary with the times and with the place. But a further purpose is served by this compilation in the very convenient means offered for making elaborate comparisons of many different appliances and parts.

The compiler has been obliged to use great care and judgment in selecting and grouping the quantities and weights for the various tables, as tables furnished by the makers often differ greatly. In this his long and responsible experience as a contracting car builder must have been of great value. Wherever it is possible he has used as the basis of his tables the standards or recommended practice of the Master Car Builders' Association.

The scheme of treatment has been, after a preliminary chapter on compiling estimates, to take up each princi-

pal part in a chapter by itself, as, for instance, the truck, the body, the draft rigging, the bolster. The final chapter gives weights and measures and general useful information, such as weights per cubic foot-strength of materials, weights of iron, lengths, sizes, etc., of screws and nails, etc. An appendix gives the Pennsylvania Railroad specifications for lumber, axles, car wheels and other parts and materials. Still another appendix gives blank forms for complete details of bills of materials.

As an example of the editor's method of treatment we may take up the chapter on trucks. This describes in general the typical trucks, and then more particularly the various special and patented trucks. Then a complete bill of materials for a set of each of these trucks is given. This bill of material gives quantities, description, material, sizes and weights, and finally there is a summary where one can enter the prices and so arrive at the cost in general and in detail. Excellent illustrations of the various trucks accompany these bills of materials. These illustrations are so well drawn and printed and generally so fully dimensioned that they are really useful and give actual information. Each chapter takes up its special topic in the same thorough way, as for instance under draw gears we have at least ten different gears well illustrated and all accompanied with complete bills of materials.

The book has been manufactured with a view to hard usage. The paper is good, the printing is good and the binding is excellent. The volume is a valuable addition to our own library, and we do not see how any man at all closely connected with freight equipment can get along without it.

The Railway Builder. A handbook for estimating the cost of American Railway Construction and Equipment. By William Jasper Nicolls, M. Am. Soc. C. E. Fifth edition, revised and enlarged. Philadelphia: J. B. Lippincott Company, 1897. Flexible morocco, 16mo., 284 pages with index and illustrations. Price, \$2.

Mr. Nicolls' little book was first published in 1878. He says that in the present edition the entire work has been carefully revised and brought up to date, that it has received many additions, the page is enlarged and a new form of binding adopted so as to render the volume suitable both for the library and the pocket. Certainly a very pretty binding has been adopted, flexible green morocco with gilt edges, and the volume might be a prayer-book or "keepsake" of selected poems. The title page, in two colors and set up with considerable effort at attractiveness, helps to distinguish this pocket-book from the general run of its class. The work itself is a modest attempt to set forth in plain language some of the facts connected with the building and equipment of a railroad. The purpose seems to have been, as stated in the preface, to do this "for the benefit of the unprofessional reader." To this end the aim is to lay down plain and simple directions for estimating on the first cost of railroads or on their renewal, and the author believes that even "the young engineer will find much that heretofore has been covered with many formulas and tedious analysis." The chapters range from surveys, through earthwork, permanent way and frogs and switches to one on equipment, and finally a chapter is given on depots and structures. If we were to attempt any very brief and general summary of the author's success in a book which has stood the test of 20 years, and which, therefore, probably needs no such verdict, we should paraphrase Dr. Johnson's estimate of the turkey, which bird he found not enough for two, but too much for one; so this little book is decidedly not enough for the engineer and probably too much for anybody else; still it must have a place in the world to have lived so long.

TRADE CATALOGUES.

The Pneumatic Engineering Co., of 100 Broadway, New York, has sent us the second edition of its catalogue which explains in detail the method of pumping by the air lift system. By means of this method it is possible to utilize all the water a well can supply, and one plant will pump the water from a large number of wells in the vicinity. Another advantage claimed for this method is that no machinery whatever is placed in the well. On page 8 the details of the construction of the "air lift" trucks are shown. A number of finely executed engravings throughout the catalogue make it very attractive. A general idea of the price of these plants may be obtained from the figures given, but this is necessarily incomplete, inasmuch as a full knowledge of the conditions as they exist in each case is required in order to make an accurate estimate of the cost of the plant.

The Stiles & Fladd Press Co., Watertown, N. Y., sends us a 6 x 9 60-page catalogue containing illustrated descriptions of power and foot presses, drop hammers, dies, power shears and special machinery. The complete manner in which the whole subject is presented, together with the price list and description of parts of the machinery, make it a valuable little book to those who use the different kinds of machinery made by this company.

TECHNICAL.

Manufacturing and Business.

The new shops of the Merchants' Despatch Transportation Co., at Penfield, N. Y., the new manufacturing city near Rochester, will probably be finished Sept. 1. Greenlee Bros. & Co., of Chicago, and the Glen Cove

Machine Co. have just been given orders for the wood working machines and the Niles Tool Works, of Hamilton, O., and Ajax Mfg. Co. for the iron tools. These shops were designed by Mr. R. H. Parks, Superintendent, and will have every possible convenience and facility for the manufacture and repair of the company's cars.

The Cleveland, Cincinnati, Chicago & St. Louis Railway is considering the advisability of putting in gas-line engines at a number of isolated water stations.

The Rhode Island Tool Co., of Providence, R. I., is building an addition to its plant. The company now employs a large number of men on extra time.

The Beardsley Car Brake Co., of Baltimore, Md., was incorporated last week, with a capital stock of \$100,000, by Ambrose A. Sweeny and Charles H. Beardsley, of New York, and Allen G. Williams, Henry C. Bush and James R. Pratt, of Baltimore.

The Master in Chancery, in the suit of the Tudor Iron Works of St. Louis against the St. Louis, Avoyelles & Southwestern Railroad, has rendered a decision in favor of the plaintiffs, awarding them \$22,000.

J. J. Colman, formerly General Manager of the Allentown, Pa., Traction Co., has been appointed Eastern Sales Agent for the St. Louis Car Coupler Co., of St. Louis, Mo. Mr. Colman will make his headquarters at Allentown.

The shafting department of the Akron Iron & Steel Co. was destroyed by fire July 4, with an estimated loss of \$100,000.

The Newton Machine Tool Works, of Philadelphia, has been incorporated with a capital stock of \$225,000. The officers are: President and Treasurer, Chas. C. Newton; Secretary, H. W. Champion; Assistant Treasurer, W. M. Graham, and Assistant Secretary, E. J. Hannum.

The Cleveland Machine Screw Co., of Cleveland, O. has been sold to a French syndicate. The amount paid is stated to be between \$550,000 and \$1,000,000.

The Keystone Drop Forge Co., recently formed, has bought the plant and business of the Philadelphia Drop Forge Co., of Philadelphia, Pa. A. Morris Hall, for a number of years with the old company, will manage the Keystone Drop Forge Co.

The Stationers' Mfg. Co., of Detroit, Mich., was incorporated June 30 by Frederick H. Bolton, Dr. C. Henri Leonard and John E. Clark. The capital stock is \$20,000. The company will make the Bolton coin wrapper.

It is stated that E. P. Ladd, of Little Rock, Ark., is in the market for about four miles of 35-lb. relaying rails.

The Taylor Car Coupler Co., of Findlay, O., has been formed by John C. Taylor, Enoch Gross, W. H. Kinley and J. H. Remsmith to manufacture and sell car couplers and railroad supplies.

The Pawtucket Mfg. Co., Pawtucket, R. I., manufacturer of bolts and nuts and bolt and nut machinery, has recently shipped several presses and small tools for the manufacture of bolts and nuts to the Sormovo locomotive building company, of Nishni-Novgorod, Russia.

The Detroit Graphite Mfg. Co., of Detroit, Mich., has recently acquired title to the graphite mines in Northern Michigan, from the ore of which it has been making its superior graphite paint. The company informs us that the ore from these mines produces the best pigment for paint so far found and that it is reduced to a fineness not always possible with other graphite. None of the graphitic carbon is abstracted for other purposes. It is not affected by acids or chemicals of any kind, and is of uniform quality.

Iron and Steel.

At the annual meeting of the Bethlehem Iron Co., South Bethlehem, Pa., the present officers of the company were re-elected as follows: President, Robert P. Linderman; First Vice-President, Robert H. Sayre; Second Vice-President, R. W. Davenport; Treasurer, C. O. Brunner; Secretary, A. S. Schropp.

The Duquesne Forge Co., at Rankin, Pa., is making 12 steel shafts for use in a Newcastle rolling mill. They are being hammered out of 34-in. steel billets and will weigh 24 tons each.

The puddling department of the Atlantic Iron & Steel Co.'s mills, at Greenville, Pa., has started up after an idleness of several weeks.

The blooming and steel department of the North mill of the Lackawanna Iron & Steel Co. was started on single turn on July 6. The company's South mill has been idle for about two weeks, but it is expected to resume within a few days.

New Stations and Shops.

The South Carolina Railroad Commissioners have been notified that a joint passenger station will be built at Denmark, S. C., by the South Carolina & Georgia, the Atlantic Coast Line and the Florida, Central & Peninsular. The station was ordered built some time ago by the Commissioners, but the South Carolina & Georgia has hitherto refused to comply with the order.

The Wilkes-Barre & Eastern is building a new round-house with capacity for 15 engines at a point about one mile from Moosic, Pa.

The Illinois Central is preparing plans for a new station at the corner of Fifth and Madison streets, Springfield, Ill. The new building will be of brick and stone with slate roof, and cost about \$75,000.

Inspection of Railroad Stations.

The Building & Sanitary Inspection Co., of New York, was recently formed, to make examination and furnish reports on the sanitary conditions of buildings, supervise the building of and inspect the materials for new structures and conduct a special mechanical and civil engineering department, to include testing steam boilers for fuel economy, heating and ventilation and electric wiring. The company intends to give special attention to regulating the sanitary conditions of railroad stations, assuming all responsibility to the relief of the engineering department. Companies with similar objects exist in different parts of Europe, but we understand this is the first company to actively engage in the United States. The Directors and officers are: Frederick W. Rhineland, George F. Canfield, John A. Middleton, William C. LeGendre, M. E. Stone, F. Augustus Schermerhorn, John M. Carrère, George Sherman, Benjamin Watkins Leigh, Thomas Newbold, William N. Wilmer, Francis C. Huntington and Thomas H. Robinson. President, George Sherman; Vice-President, William C. LeGendre; Secretary and Treasurer, Thomas H. Robinson; General Manager, Morton E. Davis, and Chief Engineer, James C. Bayles, Ph. D., M. E. The office of the company is in the Bryant Building, 55 Liberty street, New York City.

Master Car Builders' Association.

Arbitration Cases 295 to 452 have been reprinted in pamphlet form and will be furnished at 25 cents per copy.

The Rules of Interchange, as revised at Old Point Comfort, Va., in June, which go into effect on Sept. 1, 1897, will be ready for distribution about July 15, and will be furnished at the same rates as heretofore, viz.:

25 copies.....	\$1 00
50 "	1 75
100 "	3 00

A less number than 20 copies at five cents per copy. Postage will be added in all cases when sent by mail.

Bridge-Guards in Massachusetts.

The Massachusetts State Railroad Commissioners have issued an order prescribing regulations concerning bridge-guards. The standard forms of pendent, or "whip-cord," and of horizontal-bar bridge-guards, or "tell-tales," now in common use on the leading railroads of the state are approved. On main tracks and on main line sidetracks they should be placed not less than 100 ft. nor more than 200 ft. from the bridge or other overhead structure; in yards, or on switching-tracks, the guard should be placed not less than 50 ft. nor more than 100 ft. from the bridge. The distance is to be measured in all cases from a point in the center of the protected track on the near side of the bridge in the direction of the approach by trains, and a guard is to be maintained on one or both sides according as trains are run in one or both directions. When bridges are within 200 ft. of one another, one guard is to be used midway between the two. The guard should be so fixed that its lowest part shall hang about 3 in. lower than the lowest part of the structure it is designed to guard against.

The New Dock at South Boston.

The work on the great terminal dock to be built by the State of Massachusetts at the Commonwealth flats at South Boston must wait until the harbor and land commission can determine its exact location. When excavations were made recently for a dock near this point for the L. G. Burnham Coal Company it was found that jagged rocks cropped up, and the commission will now have borings made to find the rocks, so as to place the pier over them rather than go to the expense of blasting out a channel. The slip must be 35 ft. in depth. The depth of the water at the New England road's docks, originally built by the state, is only 18 ft. In the preliminary borings made by the docks and terminals commission, the drill went down through 172 ft., so that it is believed that a location can be found where the channel can be dug very easily. The State Treasurer has already sold the bonds for the \$400,000 necessary to build the new dock.

Bridges for Japan.

The air is full of stories of orders for railroad and structural material for Japan, some of which stories are so and some are not. One of the latest is that Mr. J. A. L. Waddell is preparing plans for seven bridges, the superstructures of which will cost above \$750,000, all of which will probably be bought in the United States.

The Suez Canal.

A general meeting of the Suez Canal Company was held June 9 in Paris. The receipts for 1896 were 1,466,000 francs more than in 1895, and 1895 had shown a considerable increase over 1894. The increase was largely due to the passage of soldiers and military stores. The commercial results were only fair. The military passengers included 74,000 Italians, 27,500 Spaniards, 26,700 English, 22,500 Turks, 20,200 French, 11,700 Russians and 10,300 Germans. The Dutch and the Portuguese also entered for a part of this military movement. This indicates how large and active the European military and Colonial interests are in the East. The total ships passing were 3,409, representing 8,560,000 tons.

Steel Pipe for Australia.

Last week newspaper reports stated that the Australian government had placed orders for 100 miles of 12-in. lap welded steel pipe and 300 miles of 30-in. riveted pipe, dividing the order among several tube works in Pennsylvania. Upon inquiry we learn that the Australian government has not yet awarded the contracts and is therefore still in the market for the pipe mentioned.

The National, American, Pennsylvania, Pittsburgh and Oil City tube companies will probably contest for the welded pipe and Riter & Connelly and Carroll-Porter for the riveted pipe.

THE SCRAP HEAP.

Notes.

The numerous attempts to derail the night trains of the New York, New Haven & Hartford at Slocumville, R. I., reported in the newspapers recently, which, however, were not very intelligent, are believed to have been made by a mulatto girl, who has now been arrested. She has been adjudged insane and taken to the State Asylum.

The fast mail train from St. Louis to San Antonio, Tex., over the St. Louis, Iron Mountain & Southern and the International & Great Northern has been quickened about four hours. A fast mail train has been put on over the Atchison, Topeka & Santa Fe from Kansas City to Lawrence, Topeka, Emporia and Newton, running through to the last-named place, 200 miles, in five hours.

The Pittsburgh, Fort Wayne & Chicago has been running 10-wheel passenger engines through from Pittsburgh to Fort Wayne, 320 miles, without uncoupling them from the train. This experiment was made with the New York & Chicago limited train, No. 5, which generally consists of six heavy Pullman cars. The time through is 8½ hours. The enginemen and firemen change at Crestline.

The Queens County grand jury at Long Island City, N. Y., has reported on the Valley Stream crossing accident of May 31. It has found no indictment against the railroad company, though it says that the weight of evidence strongly tends to show that the electric bell was not ringing when the accident occurred. The driver of the coach is censured for "that want of prudence and foresight which contributed in a very large degree to the catastrophe," but no indictment is found against him. The jury recommends that "the local authorities order gates or flagmen at all dangerous crossings."

The United States District Court for South Dakota has issued an injunction restraining the State Railroad Commission from attempting to put into effect the freight rate tariff recently promulgated by that Board. The injunction is to hold until Aug. 2, when a hearing will be held. The Burlington & Missouri River did not join the other railroads in the petition for an injunction, but filed a separate complaint, protesting against passenger rates only. An officer of the road said that the company felt assured that its freight rates were already so low that the Railroad Commissioners would not reduce them.

The United Mine Workers, the organization of miners in the bituminous coal districts, ordered an extensive strike on July 5, and according to the newspaper reports over 200,000 men were affected, but not all of the district organization obeyed the order, and as we go to press it appears that a large share of the men will continue at work, and the success of the strike is doubtful. The decision to strike at this time was made "in consequence of the opinion constantly expressed by business men and other experts, in whom the miners have confidence, that prosperity has returned and prices are generally rising." The increase asked is about nine cents a ton.

We have noted recently the fact that the City Government of Nashville, Tenn., has imposed certain salutary restrictions on the ticket brokers of that city, with a view to preventing misuse of round-trip tickets to the Exposition now being held there. It would appear, however, that the disturbance of the market is not yet ended, as we read in a recent number of the *Nashville American* that the Nashville, Chattanooga & St. Louis has entered suits against the 14 ticket brokers in that city, asking the Court to enjoin them from selling over the complainant's road any non-transferable ticket which bears the name of the purchaser. It is averred that the defendants are conspiring and will continue to conspire with many persons to deceive and defraud the railroad company. The injunction was granted.

American Timber for China.

According to reports from San Francisco the Chinese government has just closed a contract with D. H. Bibb for 10,000,000 ft. of railroad ties and 7,000,000 ft. of bridge stringers, to be used in building a railroad through Manchuria. The same party has also recently made a contract to deliver 5,000,000 ft. of pine lumber at Nagasaki, and the steamer Fausang has about finished loading 1,500,000 ft. of it at Portland. The shipments of Oregon lumber to the Orient since January 1 approximate 30,000,000 ft.

The New Back Bay Station in Boston.

The New York, New Haven & Hartford has published a plan of a passenger station to be located on the Providence Division at Dartmouth and Buckingham streets, Boston, a short distance out from the Park Square terminal station. The construction of a way station at this point, it will be remembered, is a part of the plan for abandoning the Park Square station and concentrating all the passenger terminals in the southern part of Boston at the new Terminal station at Summer street. The new way station is at the junction of the Providence Division of the New York, New Haven & Hartford and the main line of the Boston & Albany, these two lines, being, according to the terminal plan, consolidated into one from this point to the new terminal. The plans contemplated a joint station, to be occupied by both roads, but it is said that the Boston & Albany has been slow to agree with the New Haven in the matter, and the latter has, therefore, gone ahead and made plans for a station of its own. The State Railroad Commissioners gave a hearing on the matter last Monday, the plans having been submitted for their approval.

The station is to be 500 ft. long. The main floor will be at the grade of the streets which pass above the rail-

road, with entrances from the street, and there will be waiting and baggage rooms in the lower story at the level of the tracks. President Charles P. Clark explained the plans briefly but said he submitted them at this time in order that the commissioners and the public might have an opportunity for a thorough consideration of them during the summer. The Commissioners put the matter over until Sept. 15. President Clark is to sail for Europe soon and was anxious to have the plans in within the limit of the law. The city of Boston is expected to extend Clarendon street to Columbus avenue as soon as the present Park square station is removed, and when this is done the new station will have a frontage on Dartmouth, Clarendon, Buckingham and Harwich streets. The Boston & Albany was represented at the hearing by Samuel Hoar, but he said nothing. The plan of the new station can be easily modified so as to serve the Albany road or to make a connection between the two stations if separate stations are built.

Disinfection of Stock Cars.

The Legislature of Indiana has lately passed a law requiring railroads, stock yard associations and the managers of fair grounds to disinfect cars in which hogs have been carried, in order to prevent the spread of contagious diseases. In an action begun under this law the General Manager of the Belt Railroad & Stock Yard Co., of Indianapolis, has been charged with violation of the law, and we believe a conviction was secured, the offense being, according to the act, which became effective March 5 last, a misdemeanor. The Belt Line holds, however, that the law is unconstitutional because it is directed against railroads and stock yards, but not against consignees of swine, and the case has been appealed. We do not learn that any road has yet taken any specific action to comply with the law. While the act does not specify just what cleansing process shall be employed, one of its clauses, referring to the precautions to be taken by a farmer before sending swine to a fair, seems to indicate that washing with a solution of carbolic acid, one part acid to nine parts water, would be a compliance with the law.

The Caracas Exhibition Warehouse.

The National Association of Manufacturers of the United States of America, the general office of which is at 151 North Fourth street, Philadelphia, Pa., is sending out notice that it has finished plans for a warehouse in Caracas, Venezuela, for displaying American goods. The warehouse is designed to serve as a permanent exhibition and as a headquarters for salesmen visiting Venezuela in the interest of American manufacturers. The warehouse is being established under a special concession by the government of Venezuela, which allows American goods for exhibition in the warehouse to enter the country free of duty. The charges for space range from \$5 down to \$2 per square foot, the price being based upon the amount of space used by the exhibitor, with a minimum charge of \$25 a year.

Air Power Company.

The annual meeting of the American Air Power Company was held in New York July 1. The following Directors were elected: C. H. Allen, G. R. Blanchard, Edw. Comstock, H. D. Cooke, H. Haupt, Austin Lathrop, H. Marquand, Thos. F. Oakes, D. D. Parmly, A. W. Soper, E. A. Willard.

Railroad Bills in Congress.

Senator Teller, of Colorado, has introduced in Congress a bill providing "that a suit in equity for foreclosure of mortgage or for enforcing any lien upon or against a railroad or other line of transportation extending into or through two or more districts or circuits of the United States shall be brought only in that district where the greater part of the property subject to mortgage or lien shall be. In estimating the quantum of property subject to such mortgage or lien the greater mileage, excluding leased lines, shall be taken to be the greater part."

Senator Chilton, from the Committee on Interstate Commerce, has reported a bill extending the time allowed railroad companies between loading and unloading cattle in transit from 28 to 40 hours. Senator Chandler has added to his amendment to the tariff bill relating to pools a provision prohibiting the issuance of free passes, as follows: "The giving by one person, as officer, agent or representative of any common carrier of any free pass or any free transportation, not expressly authorized by Section 22 of the interstate commerce act, shall be deemed an unlawful discrimination and a misdemeanor, and punished accordingly."

The Stevens Scholarships of the M. M. Association.

At the Old Point convention Article VII. of the Constitution was amended, in accordance with notice given at the last meeting, as follows: "Acceptable candidates for the scholarships shall be first, sons of members or deceased members of the association; if there are not a sufficient number of such applicants for the June examinations, then applications will be received from other railroad employees or the sons of other railroad employees for the Fall examinations. Preference shall be given to the employees, sons of employees, or the sons of deceased employees. The Secretary shall issue a proper circular in this case as before." Change the last paragraph as follows: "The successful candidate shall be required to take the course in mechanical engineering."

Water-Works in Brazil.

According to a recent decree, all cities in the province of São Paulo, Brazil, are obliged to provide themselves with drinkable water, and water-works are being contemplated and executed in many places. Among the cities which contemplate the introduction of works for supplying water or illumination, may be mentioned San Carlos de Pinal, with 12,000 inhabitants; Rio Claro, with 10,000; Araraquara, with 8,000; Pirassununga, with 6,000; Leme, Descalvado, Brotas and Porto Ferreira. In some 15 cities, whose populations range from 5,000 to 15,000, water-works are already under way. In the city of São Paulo a water meter of American invention is in general use, and most of the apparatus used in water, gas and electrical works in the province has been furnished by England or this country.

The Pan-American Exposition Company.

The Pan-American Exposition Company, with principal office in Buffalo, was incorporated at Albany, N. Y., last week with a capital of \$50,000, to promote and conduct an exposition to illustrate the material progress of the new world during the nineteenth century, to be held at some point on the Niagara frontier in New York state, and for the purpose of purchasing or leasing such location, constructing such buildings as may be necessary, and to make contracts for power purchases. The directors are: Roswell P. Flower, Chauncey M. Depew, H. Walter Webb, Daniel O'Day, Edgar Van Etten, William F. Sheehan and E. B. Thomas of New York city; John M. Brinker, Fred C. M. Lautz, Charles N. Haskins, Charles R. Huntley and Herbert P. Bissell, of Buffalo, and W. Cary L. Ely of Niagara Falls.

LOCOMOTIVE BUILDING.

A new locomotive has recently been built at the shops of the Texas & Pacific at Marshall, Tex.

It is reported that E. P. Ladd, of Little Rock, Ark., is in the market for a 20-ton standard-gage locomotive.

The Richmond Locomotive Works, of Richmond, Va., has received orders from the Galveston, Houston & Henderson Railroad for two switching locomotives, and from the Louisville & Nashville Railroad for 10 consolidation locomotives.

CAR BUILDING.

The International & Great Northern is reported in the market for 150 freight cars.

It is stated that the Philadelphia & Reading Railroad has begun building 300 more coal cars at its Reading shops.

The Chattanooga (Tenn.) Car & Foundry Co. is building 300 cane cars for Magnolia plantation, Plaquemine Parish, La.

The Cleveland, Cincinnati, Chicago & St. Louis has built at its Brightwood shops a special car to carry sugar cane crushers.

The report published by a contemporary that the Chicago, Milwaukee & St. Paul will build 300 more cars at its own shops is denied by the General Manager's office of that road.

The Cameron & Barkley Co., dealer in iron and railroad supplies, Charleston, S. C., is in the market for 20 gondola cars of 30 tons capacity and equipped with automatic couplers and hand brakes.

The report which has been generally circulated and published by a contemporary that the Canada Atlantic has placed an order with the Pullman Car Co. for 800 cars is denied by the car company.

Davies Bros. & Hartman, of Philadelphia, Pa., have received an order to build 10 end dump cinder cars of 10 tons' capacity for the Bethlehem Iron Co., and one of the same type of 17 tons' capacity for the Maryland Steel Co.

The Ohio Falls Car Mfg. Co. is practically rebuilding 400 box and 100 gondola cars for the Baltimore & Ohio Southwestern. The Buckeye coupler, made by the Buckeye Malleable Iron & Coupler Co., of Columbus, O., is being applied to these cars.

The Terre Haute Car & Mfg. Co. has an order from the Live Poultry Transportation Co. for 37 cars suitable for shipping live poultry. Westinghouse air brakes will be used, but much of the special equipment for these cars is undecided at the present time.

The Canadian Pacific has begun building 600 35-ft. box cars of 30 tons' capacity at its Perth shops. The company has also awarded contracts to the Crossen Car Mfg. Co., of Cobourg, Ont., and to Rhodes, Curry & Co., of Amherst, N. S., each to build 200 33 ft. flat cars of 20 tons' capacity.

The Atlanta & West Point Railroad last week received four new passenger cars from the St. Charles Car Co., of St. Charles, Mo. They are 65 ft. long, with an interior finish of quarter oak, with solid bronze trimmings. They are equipped with Gould vestibules, Pintsch gas and Westinghouse quick action brakes and train signals.

BRIDGE BUILDING.

Agasta, O.—Bids are asked July 16 for an iron bridge across the Big Scioto River, near here. U. K. Suthery, County Auditor, Marion, O.

Baltimore, Md.—The Maryland Steel Co. has received the contract to build an iron bridge over Herring Run, on the Belair road, and three small bridges between here and Gardenville for the new electric line now being built.

Bellwood, Ont.—A steel bridge will be built over the Grand River at this place. Mr. Hutcheon, of Guelph, will have charge of the work.

Brooklyn, N. Y.—Bids are asked until July 12 for a lift bridge over Coney Island Creek, between West 17th street and West 18th street. T. B. Willis, Commissioner of City Works.

Duluth, Minn.—The new drawbridge between here and Superior, Wis., was formally opened for traffic July 1. This bridge is 1,094 ft. long, has a draw span 491 ft. long and a headway of 20 ft. The draw is operated by electricity. The bridge is used by street traffic and steam and electric railroads. Mr. Alfred P. Boller, Consulting Engineer, New York, was the designer; Alexander McGraw, of Philadelphia, was the contractor for the substructure, and the Pennsylvania Steel Co. the contractor for the superstructure.

Easton, Md.—Among the appropriations made by the County Commissioners for the current year are \$1,050 for rebuilding Miles River bridge and \$1,400 for county bridges.

Evan's Falls, Pa.—The bridge over Bowman's Creek at this place is about to be rebuilt.

Jefferson City, Mo.—Plans, it is said, are asked until July 12 and bids until July 13 for a steel bridge 200-ft. span, with a 60-ft. girder or truss span at each end, and a 16-ft. roadway. H. S. Dewey, Commissioner.

Niagara Falls, N. Y.—It is reported that the contract to replace the upper Suspension Bridge with a steel arch bridge has been awarded to the Pencoyd Iron Works, of Philadelphia.

Philadelphia, Pa.—Bids are asked July 20 for the masonry, substructure, abutments and retaining walls for a swing bridge over the Schuylkill River at Gray's Ferry. T. M. Thompson, Director of Bureau of Surveys.

Saratoga, N. Y.—The contract for a steel bridge at this place has been given to the Wrought Iron Bridge Co., at \$14,480.

Titusville, Pa.—Councils have given the contract to build the approach to the Brown street bridge to the Wrought Iron Bridge Co., Canton, O., for \$1,976.

Toronto, Ont.—J. McDougall, County Engineer, has been ordered by the York and Peel County Councils to

prepare plans and invite tenders for a 45-ft. span bridge over the Mimico River, between Etobicoke and Toronto Junction.

Winnipeg, Man.—The City Council and the ratepayers have decided to spend \$27,500 for a new steel superstructure for the Main Street Bridge, and to convert the present superstructure into an overhead bridge across the Canadian Pacific, at Salter street.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulations of Railroads.

In Texas, damages to stock shipped under a contract with the Receivers of a railroad after its sale, but before delivery to the purchaser, cannot be recovered of the company or purchaser in the absence of a showing that the Receiver derived funds from the operation of the road, and turned them over to the company or purchaser, or made permanent improvements on the property therewith.¹

In Texas a railroad is not relieved from liability for negligence in the operation of its road by the fact that it was in the hands of a Receiver, where it was returned to the company without sale, and a large amount was expended for betterments during the receivership.²

In the Federal Court it is held that a petition for payment by the Receivers of a railroad of a judgment against one of the road's subsidiary companies in preference to an antecedent mortgage will not be allowed by a court other than that which appointed the Receivers, it not appearing that any funds have come into the hands of the Receivers from the operation of the subsidiary line.³

In Georgia it is decided that the statute requiring signals to be given at railroad crossings, and the speed of the trains to be checked, applies only to crossings of roads established as provided by law, and not to private roads, though used more or less by the public.⁴

In Pennsylvania land used by a railroad for a coal yard or ore terminal is subject to assessments for street improvements.⁵

In Pennsylvania it is held that where several railroads have entered into a contract for the interchange of traffic, etc., and two of them have agreed to set aside a certain portion of their gross receipts for the purchase of the bonds of another, and have complied with such agreement, the contract should be specifically enforced, when the roads which have received the benefit of the consideration refuse to comply.⁶

In North Carolina a freight train, which had been unavoidably delayed beyond its schedule time, was run from one station to another, 10 miles distant, after 9 o'clock on Sunday morning, contrary to the provisions of statute, because of a lack of water or coal for the engine at the first station and of subsistence for the train crew. The Supreme Court decides that such facts did not constitute a defense to a prosecution for a violation of the law.⁷

In the District of Columbia a statute provided that the directors of the company "shall, from time to time, fix, determine and regulate the fares, tolls and charges to be received and paid for transportation of persons and property." The Supreme Court holds that the government did not thereby renounce its right to reasonably limit the charges for transportation of persons and property over such railroad.⁸

In this case it is ruled that the presumption that a rate fixed by Congress is reasonable cannot be overcome except by some showing as to expenses and receipts during an adequate period.⁹

In the Federal Court it is decided that failure for 20 years to operate a railroad on certain streets included in a franchise raises a presumption of abandonment of the grant as to such streets.¹⁰

Injuries to Passengers, Employees and Strangers.

In New York the Supreme Court rules that where a passenger was injured by the breaking of a brake chain in a street car, but there is no evidence that any other or safer appliances were in use, it is error, in an action for the injury, to charge that "the appliances used by defendant must be the best that skill and science have contrived, and which are in practical use."¹¹

In the same Court it is held that a finding of negligence is sustained by evidence that the conductor saw that a gate on a street car was so bent that it could not be bolted, and that he neglected to tie or secure it, and that it flew open, and precipitated a passenger into the street.¹²

In Wisconsin the Supreme Court rules that it is the duty of a railroad which sells a passenger a ticket to a place on its line of road, and a sleeping-car ticket to an intermediate point, where the passenger is required to change cars, to awaken a passenger a sufficient time before reaching such point to allow an opportunity to dress and prepare to make the change.¹³

In New York it is decided that the fact that persons are not ordinarily thrown from their seats in a car in rounding a curve does not justify the presumption that an injury so caused was due to the want of care of defendant.¹⁴

In the Federal Court it is held that in an action for injuries to one in charge of live stock during transportation, the contract for which provided that such person should remain in the caboose car while the train was in motion, it is proper to refuse a peremptory instruction based on the theory that he was bound to remain in the caboose whether or not the train was in motion.¹⁵

In the Federal Court it is held that the danger from the ragged silver upon the wheel of a locomotive being apparent, a person employed to clean the engine assumes the risk.¹⁶

In Missouri a railroad which undertakes to haul a foreign car, and has an opportunity to inspect it, is negligent if it fails to discover and repair dangerous defects in the coupling appliances.¹⁷

In Georgia it is held that where a car was left unhooked and unbraked on a sidetrack having a downward grade, and, on being put in motion by a sudden windstorm, ran over and killed a railroad agent, who was crossing the track holding an umbrella so as to obstruct his view, the company was not liable; it appearing that deceased was the sole employee of the company at the station, having full charge of locating cars on the track, that the car was left exactly as he directed and that he knew it was unhooked and unbraked.¹⁸

In Texas a servant set to work to repair a bridge is presumed to have notice of its unfinished state and assumes the risk thereof, unless the master does something to increase the risk.¹⁹

In Pennsylvania it appeared that on a stormy winter morning, deceased was one of a gang sent out to release a train which had become snowbound about two miles west of the city, on the eastbound track; that in order to keep open the westbound track, between which and the other track there was a clear space of seven feet, it became necessary to run engines over it every few minutes; that in the afternoon deceased, while still at work shoveling snow from the eastbound track, was struck by a belated passenger train coming from the city, on the

westbound track, and was killed; that the division superintendent had not notified the engineer of said train, before it left the city, of the position of the blockaded train; and that such notice would have been impracticable, since the train might have been moved some distance since morning and there were, moreover, about 100 gangs along the line, engaged in clearing the tracks. The Supreme Court decides this insufficient to show any negligence on the part of the railroad company.²⁰

In Arkansas it is held that there being evidence that a child four years old, struck by a train at a railroad crossing, had been standing with a woman 15 ft. from the track, in plain sight of the train, and that it suddenly broke away from her, and had run nearly across the track when struck, it is a question for the jury whether failure to keep a proper lookout did not cause the accident, it being admitted that the fireman was not keeping a lookout, and the engineer testifying that, though keeping a lookout, he did not see the child.²¹

In Virginia, in an action against a railroad, it appeared that plaintiff got on a box car to steal a ride. He testified: That he got on between two box cars, and was standing between the cars, when a man said: "What are you doing?" That he just turned his back to get off, "and he kicked me and knocked me off." His testimony placed the man who kicked him off on top of the car, and he testified that the man had nothing in his hands; "It felt like a kick." "I guess it was a kick." The testimony showed that from the top of the car to plaintiff's shoulder, where he said he was kicked, was 3½ ft., and that it was impossible for a man to stand on top of the car and kick down 3½ ft., especially when the cars were in motion. The Supreme Court holds that a verdict for plaintiff was contrary to the law and evidence.²²

In Michigan it is decided that the fact that the mother of a child two years old permitted him to play with other children in the yard, whence he wandered out to railroad tracks, does not, as a matter of law, show contributory negligence, the testimony showing that he was only out of sight for a few minutes.²³

In Illinois it is laid down that because persons have been in the habit of using a railroad track for a foot-path does not render the company liable for injuries to such a person from a passing train, unless wantonly or willfully inflicted, though the company, by care, could have discovered his presence on the track.²⁴

- ¹ Holman v. G. H. & S. A., 37 S. W. Rep., 461.
- ² T. & P. v. Gaal, 37 S. W. Rep., 462.
- ³ Dillon v. O. S. L. & U. N. (C. C.), 75 Fed. Rep., 949.
- ⁴ Comer v. Shaw, 25 S. E. Rep., 733.
- ⁵ Philadelphia v. P. & R., 35 Atl. Rep., 610.
- ⁶ C. V. v. G. & H., 35 Atl. Rep., 952.
- ⁷ State v. South. Ry., 25 S. E. Rep., 862.
- ⁸ A. & P. v. U. S., 76 Fed. Rep., 186.
- ⁹ A. & P. v. U. S., 76 Fed. Rep., 186.
- ¹⁰ T. Co. v. Cincinnati, 76 Fed. Rep., 206.
- ¹¹ Wynn v. Central Park, 41 N. Y. S., 495.
- ¹² Pendergast v. Union Ry. (Sup.), 41 N. Y. S., 927.
- ¹³ McKeon v. C. M. & St. P., 69 N. W. Rep., 175.
- ¹⁴ Wilder v. Met. St. Ry., 51 N. Y. S., 931.
- ¹⁵ T. & P. v. Reeder, 76 Fed. Rep., 550.
- ¹⁶ McCain v. C. B. & Q., 76 Fed. Rep., 125.
- ¹⁷ Bender v. St. L. & S. F., 37 S. W. Rep., 132.
- ¹⁸ B. & W. v. Smith, 25 S. E. Rep., 759.
- ¹⁹ Allen v. G. H. & S. A., 37 S. W. Rep., 171.
- ²⁰ Nye v. P. R. R., 35 Atl. Rep., 627.
- ²¹ St. L. I. M. & S. v. Denly, 37 S. W. Rep., 719.
- ²² Ch. & O. v. Anderson, 25 S. E. Rep., 947.
- ²³ Green v. C. & W. M., 68 N. W. Rep., 983.
- ²⁴ Wabash v. Jones, 45 N. E. Rep., 50.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

- Augusta & Savannah*, 2½ per cent., payable July 6.
- Boston & Providence*, quarterly, 2½ per cent., guaranteed, payable July 1.
- Canada Southern*, 1 per cent., payable Aug. 2.
- Connecticut River*, 5 per cent., payable July 1.
- Columbia & Western*, semi-annual, 2 per cent., payable Aug. 10.
- Cumberland Valley*, quarterly, 2 per cent., payable July 1.
- Georgia Railroad & Banking Co.*, quarterly, 2½ per cent., payable July 15.
- Mine Creek & Schuylkill Haven*, \$1.50, payable July 15.
- Old Colony*, quarterly, 1½ per cent., payable July 1.
- Pittsburgh, Ft. Wayne & Chicago*, quarterly, 1½ per cent., on guaranteed stock, payable July 1, and the regular quarterly guaranteed dividend 1½ per cent., payable July 6.
- Pittsburgh & North Adams*, 2½ per cent., payable July 1.
- Portland & Rochester*, 3 per cent., payable July 15.
- Portland, Saco & Portsmouth*, 3 per cent., payable July 15.
- Rio Grande Western*, 4 per cent. on preferred stock, payable in preferred stock, Aug. 16.
- Ware River*, 3½ per cent., payable July 6.
- Wrightsville & Tennille*, 4 per cent. on common and preferred stock, payable July 1.

- Baltimore Traction*, 1½ per cent., payable July 15.
- City & Suburban* (Baltimore, Md.), 3 per cent., payable July 6.
- Cleveland City*, quarterly, ¾ per cent., payable July 10.
- Hestonville, Mantua & Fairmount Passenger* (Philadelphia), 2½ per cent. on common stock and 3 per cent. on preferred stock, both payable July 15.
- New London* (Conn.), 3½ per cent., payable July 1.
- North Chicago*, quarterly, 3 per cent., payable July 15.
- Norwich* (Conn.), 2½ per cent., payable July 1.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

- The *American Society of Railroad Superintendents* will hold its next meeting at Nashville, Tenn., beginning Sept. 22.
- The *American Street Railway Association* will hold its sixteenth annual convention in Convention Hall, Niagara Falls, Oct. 19-22, 1897.
- The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.
- The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.
- The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.
- The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.
- The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers and Architects Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 25 East Eighth street, Cincinnati, O., on the third Thursday in each month, at 7:30 p. m. Address P. O. Box 333.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago.

The *St. Louis Railway Club* holds its regular meeting on the second Friday of each month, at 3 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736-1739 Monadnock Block, Chicago.

Western Society of Engineers.

A regular meeting of the Western Society of Engineers was held Wednesday evening, July 7, in the society rooms, Monadnock Block, Chicago. A paper was read entitled "Limestone Screenings in Cement Mortar," which gave the results of numerous tests of cement and concrete, made by Prof. A. N. Talbot at the University of Illinois. The tests showed that in general the strength of concrete made with screenings free from dust and broken stone was greater than that of concrete made with sand and broken stone where either Portland or Louisville cement was used. The best results, however, were obtained with a mixture of one part of fine sand, three parts of coarse screenings and six parts of broken stone.

Traveling Engineers' Association.

Circulars requesting answers to the following questions, for discussion at the next annual meeting, have been sent out by the Secretary: Subject, "The Brown System of Discipline." 1. Have you the "Brown System of Discipline" or any modification of the same in force on your lines? If so, explain the methods used. 2. Give information as to the working of the system. 3. Any other information of interest. G. W. Gould, Chairman, 202 East Thirtieth street, Minneapolis, Minn. Geo. Gregory, J. B. Johnson, J. R. Bolton, A. L. Moler, Committee. Subject, "The Preparation of Coal for Use on Locomotives and Proper Tools to Be Furnished?" This refers to bituminous coal. 1. Maximum size to which coal should be broken. 2. When should the breaking be done? (a) Does it pay to have the coal broken before it is put on the engine? (b) Why? 3. Is all lump better than a mixture of lump and fine coal? (a) Why? 4. Should coal be wet before put in furnace? (a) Why? 5. What style of grate bars in preferable? (a) If finger grates, give length and amount of space around fingers? 6. What tools are necessary for the fireman to do work properly? D. R. McBain, Chairman Traveling Engineers, M. C. R. R., Jackson, Mich.; F. T. Slayton, W. C. Hayes, W. R. Johnson, H. L. Stevenson, Committee. Subject, "How Should a Locomotive be Operated to Secure the most Economical Use of Steam and Fuel, Speed and Weight of Train to be Considered?" 1. Should a locomotive be worked with throttle wide open under all possible conditions? 2. Is it economical for enginemen, when possible, to regulate speed with throttle, with reverse lever, or with both? 3. Is it good judgment to work steam expansively beyond a certain limit; if not, where would you place the limit? 4. To attain the most economical results, would you carry water in boiler as high as possible? Why? 5. Have you ever compared the coal record of a wide-open throttle engineer with the man who runs with throttle partly closed? Give results. 6. Is the loss from condensation, caused by working steam too expansively, sufficient to warrant partially closed throttle with longer cut-off? W. E. Widgeon, Chairman, Logansport, Ind.; N. A. Moore, J. W. Graham, George W. Wilden, J. T. Wilson, Committee. The next meeting of the club will be held at Chicago, Ill., commencing Sept. 14.

PERSONAL.

—Mr. LeGrand Young has been appointed General Attorney for Utah of the Union Pacific System, with headquarters at Salt Lake City.

—Mr. Floyd L. Smith, District Passenger Agent of the Cincinnati, Portsmouth & Virginia, at Portsmouth, O., has resigned and the office has been abolished.

—Mr. R. W. Daniel, Soliciting Agent of the Seaboard Air Line, at Augusta, Ga., has been transferred to Baltimore to succeed Mr. C. F. Hedding, resigned.

—Mr. George L. Philben has been appointed Superintendent of Construction of the Duluth, Missabe & Northern, with headquarters at Burnett, Minn.

—Mr. W. C. Smith has been appointed Commercial Agent of the St. Louis & San Francisco in charge of freight and passenger business, with headquarters at Springfield, Mo.

—Mr. Bryce Gray died at his home in New York City

on June 29, aged 71 years. Mr. Gray was at one time a Director of the Atlantic & Pacific and also of the St. Louis & San Francisco.

—Mr. John M. Savin, who has for some time past been General Manager and Agent of the Trustees for the Quincy, Omaha & Kansas City, took charge of the Omaha & St. Louis on July 1.

—Mr. W. P. Harris has been appointed General Superintendent of the lines of the Plant System west of Waycross, with headquarters at Montgomery, Ala., to succeed Mr. C. O. Parker, resigned.

—Mr. J. S. Hetherington, General Agent of the Baltimore & Ohio Southwestern, in Kansas City, Mo., has resigned. It is expected that he will be succeeded by Mr. C. W. Tomlinson, of Cincinnati.

—Mr. Henry W. Gays, heretofore General Manager of the St. Louis, Chicago & St. Paul, at St. Louis, has been elected General Manager of the Chicago, Peoria & St. Louis, with headquarters at Springfield, Ill.

—Mr. C. E. Fink, Car Accountant of the Chicago & West Michigan, at Grand Rapids, Mich., has been put in charge of the car department of the Detroit, Grand Rapids & Western, in addition to his other duties.

—Mr. J. W. Stevenson, of Wabpeton, N. Dak., has been appointed Traveling Freight Agent of the Great Northern, with headquarters at Pittsburgh, to succeed Mr. H. H. Marsh, resigned to go to the Baltimore & Ohio.

—Mr. Herman Holmes, formerly Traveling Passenger Agent of the Louisville & Nashville, at Medina, O., has been transferred to Nashville, Tenn., owing to the increase in business on account of the Centennial Exposition.

—Mr. W. J. C. Kenyon, formerly General Freight Agent of the Chicago, Burlington & Northern, has been appointed General Manager of the Union Stock Yards Co., of Omaha, Neb., to succeed Mr. W. N. Babcock, resigned.

—Mr. W. S. Smith, heretofore Traveling Freight and Passenger Agent of the Wabash, with headquarters at Seattle, Wash., has been appointed General Traveling Freight Agent of the same company, with headquarters at St. Louis, Mo.

—Mr. Robert T. Ryon died suddenly at Columbia, Pa., on June 30. Mr. Ryon was at one time President of the Hanover Junction & Susquehanna, which now forms the Reading, Marietta & Hanover Branch of the Philadelphia & Reading.

—Mr. Scott Davis, who for a number of years has been Western Representative of the Union Stock Yards Co., of South Omaha, has been appointed Western Live Stock Agent of the Union Pacific, with headquarters in Salt Lake City, Utah.

—Mr. John Dempsey, Master Mechanic of the Central of Georgia at Macon, Ga., has been put in charge of the car building department at that place, and Mr. S. A. Charpiot, formerly Master Car Builder, has been transferred to Savannah, Ga.

—Mrs. Lillis V. England, wife of R. H. England, General Manager of the Oconee & Western Railroad, died at her home in Rochester, N. Y., on Thursday, June 24, after a few days' illness from fever contracted in Georgia. She was 27 years of age.

—Mr. Joseph S. Mills, who for many years has been Trainmaster of the Baltimore & Ohio Southwestern, with headquarters at Washington, Ind., has been appointed Superintendent of the Springfield Division of that road, with headquarters at Flora, Ill., to succeed Mr. W. N. McMahon.

—Mr. E. A. Cooper, heretofore City Passenger Agent of the Chicago & Alton at Denver, Col., has been appointed Traveling Passenger Agent for that road, with headquarters at San Francisco. He succeeds Mr. J. W. Adams, who resigned to accept a position with the New York, Chicago & St. Louis.

—Mr. J. P. Higgins has been appointed Commercial Agent of the Central of Georgia, with headquarters at St. Louis, Mo., to succeed Mr. T. C. Manion, resigned. Mr. Higgins has been connected with the Central of Georgia for four years as Chief Clerk at Chicago and Soliciting Agent at St. Louis.

—Mr. H. W. Downey, formerly General Agent of the Chicago Great Western, at Dallas, Tex., has been appointed General Freight and Passenger Agent of the Galveston, Houston & Henderson, with headquarters at Galveston, Tex., to succeed Mr. H. F. McFarland, recently appointed Commercial Agent of the Missouri, Kansas & Texas.

—Mr. Charles F. Smurr, heretofore General Freight Agent of the Pacific System and of the lines in Oregon of the Southern Pacific, has been appointed Freight Traffic Manager of the Pacific System. He will be succeeded in his former positions by Mr. William Sproule, heretofore Assistant General Freight Agent of the Pacific System.

—Mr. D. D. Donahue has been appointed Commercial Agent of the Houston, East & West Texas, with headquarters at Shreveport, La. Mr. Donahue was formerly Auditor and General Freight and Passenger Agent of the Texas, Louisiana & Eastern, at Conroe, Tex., but resigned that office May 1, 1897, when that line passed into the hands of the Atchison, Topeka & Santa Fe.

—Mr. John S. Hoagland died on July 5 at his summer home at Hempstead, L. I., at the age of 63 years. Mr. Hoagland was at one time Superintendent of the Coney Island & Brooklyn Railroad. He retired from that office 12 years ago to become Superintendent of Transportation of the New York & Brooklyn Bridge, which position he resigned in 1892 on account of ill health.

—Mr. Robert Gillham, formerly Acting General Manager and Chief Engineer of the Kansas City, Pittsburgh & Gulf, has been made General Manager and Chief Engineer of that company. Mr. Gillham built the first cable street railroad in Kansas City, and subsequently the Kansas City Elevated Railroad. He was also Chief Engineer of cable street railroads of Omaha and Denver.

—Mr. E. M. Fisher has been appointed Auditor for the Receiver of the Columbus, Sandusky & Hocking, with headquarters in Columbus, O., to succeed Mr. A. W. Dunning, resigned. Since Mr. Dunning's resignation Mr. D. D. Byers, Chief Clerk in the department, has been Acting Auditor. Mr. Fisher was lately the Assistant Auditor for the banking firm of Kingan & Co., Ltd., of Cincinnati.

—Mr. Perry Griffin, formerly Joint Agent at Chicago, for the Louisville, New Albany & Chicago, Cincinnati,

Hamilton & Dayton, and Baltimore & Ohio Southwestern roads, has been appointed Traveling Passenger Agent for the Chicago, Rock Island & Pacific, at New York City, to succeed Mr. James Gass, recently appointed New York State Passenger Agent for the Wabash, at Buffalo, N. Y.

—Mr. George Gibbs has been appointed Consulting Engineer to the Westinghouse Electric Company and the Baldwin Locomotive Works, to fill the place left vacant by the death of Mr. D. L. Barnes. He will leave the service of the Chicago, Milwaukee & St. Paul, and we hear that there will be a radical change in the ownership and control of the Gibbs Electric Co. The Baldwin-Westinghouse people would have had hard work to find another man in the United States so well qualified as Mr. Gibbs for this work and we judge that his appointment means an active development of the electric locomotive business.

—Mr. Morton E. Davis, who has been in railroad service for more than 30 years, has been made General Manager of the Building & Sanitary Inspection Co., with office at 55 Liberty street, New York City. Mr. Davis is well versed in methods of operating railroads. He began railroad work as a freight brakeman on the Wisconsin Division of the Chicago & Northwestern in 1863, and after serving as passenger conductor, and Acting Division Superintendent on other Western roads, was, in May, 1893, put in charge of the World's Fair terminals of the Illinois Central, finishing without an accident. Mr. Davis has many friends among railroad officers and business men in New York.

—Mr. Henry B. Stone was killed at his summer home in Nonquitt, Mass., July 5, by an explosion of fireworks. Mr. Stone spent his entire railroad career on the Chicago, Burlington & Quincy, first entering the shops and soon after becoming Division Master Mechanic. He was appointed Superintendent of the Locomotive and Car Departments in February, 1880, and was afterward successively General Superintendent, Assistant General Manager and General Manager, holding the last named office at the time of the great strike of locomotive enginemen on the Burlington in 1888. He was appointed Second Vice-President of the company in November, 1888, and held that position until his resignation, in April, 1890. Mr. Stone was President of the Chicago Telephone Co. and the Central Union Telephone Co., at Chicago, both which offices he had only recently resigned, expecting to go to Europe for several months and on his return to engage in another line of business. Mr. Robert T. Lincoln has been elected temporary President of the Chicago Telephone Co., and Mr. William A. Jackson President of the Central Union Telephone Co., to succeed Mr. Stone.

—We learn with great regret of the death at Brisbane, New South Wales, June 21, of Mr. E. M. G. Eddy, Chief Railway Commissioner for New South Wales. Mr. Eddy was still young enough and strong enough for his friends to expect that his useful and energetic life might yet be prolonged many years. It seems, however, that he had recently been suffering from lumbago and gout and that his death was sudden and due to the gout having attacked his heart. Mr. Eddy served in his early life on the London & North Western Railway, whence he went to the Caledonian as Assistant General Manager. From this service he was appointed, about nine years ago, as Chief Commissioner of Railways for New South Wales. We have so often given the particulars of the steady improvement of railroad conditions in that colony that it would be superfluous to say much now on that subject. It is sufficient to say that under Mr. Eddy's vigorous administration public service has increased, earnings have increased, cost of operation has been reduced and physical improvements and improvements in the personnel have been made all along the line. Mr. Eddy did not hesitate to ransack the world for that which was best and he took from America many ideas in rolling stock and in track maintenance. His work has been made difficult, owing to the political and social conditions of the Colony. The labor element is strong; the Colonial protectionists are also strong, and the Commissioners have always had to struggle against the notion that all material should be made or purchased in the Colony and they always had to work against the efforts of the labor leaders in the Colonial parliament to raise wages, restrict hours of labor and otherwise interfere with economy and discipline. Mr. Eddy has steered his way through these stormy waters with great resolution and ability, to the profit of the Colony. A few years ago we talked frequently about Mr. Eddy with some of the best-informed railroad men of Great Britain, and the general sum of the opinion seemed to be that he was one of the ablest and one of the soundest men whom the British railroads have bred for a good many years.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—The jurisdiction of W. B. Biddle, Freight Traffic Manager, and of W. F. White, Passenger Traffic Manager, has been extended over the Santa Fe Pacific Railroad, recently acquired by this company. E. Chambers, General Freight Agent of the Southern California, has, in addition, been appointed General Freight Agent of the Santa Fe Pacific and will report to Mr. Biddle. J. J. Byrne, General Passenger Agent of the Southern California, has, in addition, been appointed General Passenger Agent of the Santa Fe Pacific and will report to Mr. White. The above changes took effect July 1.

Boston & Maine.—The office of Assistant General Freight Agent at Concord, N. H., made vacant by the appointment of D. C. Prescott as General Freight Agent of the Maine Central Railroad and of the Portland, Mt. Desert & Machias Steamship Co. has been abolished, and we understand that the business formerly done by Mr. Prescott will be transacted through the general freight office in Boston.

Flint & Pere Marquette.—At a meeting of the new Board of Directors, held at Boston, Mass., June 29, officers were elected as follows: President, William W. Crapo; Vice-President, John M. Graham; Secretary and Treasurer, H. C. Potter, Jr.

Great Northern.—The following appointments have recently taken effect: W. T. Tyler, Superintendent William Division, to succeed J. Russell, transferred; R. H. Bowron, Superintendent Breckenridge Division, to succeed F. L. Corwin, resigned; J. Russell, Superintendent Dakota Division, to succeed J. G. Taylor, transferred; J. G. Taylor, Superintendent Montana Division, to succeed R. H. Bowron, transferred; A. M. Smith, Trainmaster St. Cloud & Fergus Falls Division, to succeed W. T. Tyler, promoted.

Houston, East & West Texas.—Milton Everett, Assistant General Passenger Agent, having resigned, that office has been abolished and the duties will hereafter

be performed under the direct supervision of General Freight and Passenger Agent R. D. Yoakum.

International & Great Northern.—F. O. Becker, Assistant General Freight Agent at Galveston, has been assigned to other duties, and that office abolished. J. H. Hawley has been appointed General Agent at Galveston, Tex.

Monson.—At the annual meeting of stockholders held at Monson, Me., June 30, the present Board of Directors was re-elected. Officers were then elected as follows: President, H. A. Whiting; Vice President, Treasurer and General Manager, J. F. Kimball; Attorney, J. F. Sprague; Superintendent, W. L. Estabrooke.

Norfolk & Western.—The office of Superintendent of Transportation, made vacant by the death of Col. Frank Huger, has been abolished. J. F. Snyder has been appointed Car Service Agent in charge of car equipment and distribution.

Olean, Rock City & Bradford.—Officers and Directors of this company, a notice of the incorporation of which appears in another column, have been elected as follows: President, W. B. Ferguson, Malden, Mass.; Vice President, Frank E. Lowe; Secretary and Treasurer, George E. Rogers; Directors, the above named officers with E. B. Sage, C. A. Richardson, George Forbes, Charles E. Barnes, C. E. Hudson and H. L. Pierce.

Sabine Terminal.—The first Board of Directors of this new company in Texas is composed of the following: Augustus Higby, Charles H. Quinn, Charles D. Stillman and J. W. Brownlee, of Sabine Pass; L. J. Kopke and William S. Osgood, of Beaumont, Tex.; Leo, H. Albright, of Chicago; Joseph O. Osgood, W. S. Parkinson and W. C. Parkinson.

Southern.—The following appointments have been made: A. Ramseur, Trainmaster, between Greenville, S. C., and Belt Junction, Ga., including branches; office, Greenville, S. C.; S. B. Bennett, Trainmaster, between Cleveland, Tenn., and Atlanta, Ga., Ooltewah Junction and Cohutta, Tenn., Rome, Ga., and Attalla, Ala., and Atlanta and Fort Valley, Ga.; office, Atlanta, Ga.; C. S. Hayden, Trainmaster, between Austell and Cardiff and Birmingham, Bessemer and Blossburg yards; office, Birmingham, Ala.; W. S. Hobbs, Trainmaster, between Cardiff and Greenville, Miss., and Webb and Percy branches; office, Columbus, Miss.; J. H. Walsh, Trainmaster, between Monroe and Spencer, including branches; office, Greensboro, N. C.; H. A. Williams, Trainmaster, between Greensboro, and Goldsboro, University and Chapel Hill, and Selma and Pinner Point; office, Greensboro, N. C.; C. L. Ewing, Trainmaster, Asheville, N. C.; B. O. Payne, Trainmaster, Knoxville, Tenn.; J. E. McCarthy, Trainmaster, Charlottesville, Va.; J. A. Droege, Trainmaster, Charlotte, N. C. A freight and ticket agency has been established at Joyes, Ky., with A. M. Cowherd, Agent. The name of Neapolis, Va., has been changed to North Danville, R. & D. Junction to Neapolis, and Manns Crossing, Va., to Maplewood.

Toledo & Milwaukee.—Officers of this new company, notice of the organization of which was given in these columns last week, have been elected as follows: President, C. S. Brice; Vice President, Samuel Thomas; Treasurer, O. R. Leland; Directors, the above together with Frank B. Drake, George M. Sheldon, Walter B. Richie and Henry C. Smith.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Canadian Pacific.—M. J. Haney, Manager of Construction of the proposed Crow's Nest Pass line, to be built by this company from Lethbridge, Northwest Territory, west 330 miles to Nelson, B. C., has asked bids for grading the first 100 miles of the line from Lethbridge. The work is to be let in two sections of 50 miles each. Tenders for the first 50 miles must be in by July 12, and for the second section by July 15. Profiles can be seen and further information obtained at the company's office at McLeod, which for the present is to be the building headquarters.

Columbia Southern.—Grading on this new road in Oregon was begun June 21, about 150 men being put at work. The company was incorporated in Oregon on March 4 with a capital stock of \$100,000. The proposed line is to extend from Biggs, Ore., on the Oregon Railroad & Navigation Company's line, south about 120 miles to Prineville, Crook County, Ore., via Wasco, Sherman County. It is expected to complete that portion of the line between Biggs and Wasco, 10 miles, before fall. The proposed route of the road to Prineville passes through an open rolling country lying between the John Day and the Des Chutes rivers. The road, which will be standard gauge, will connect with the Oregon Railroad & Navigation Company's line at Biggs. It is expected to do a large business in grain transportation.

Georgia Pine.—This company has recently been organized in Georgia to build a road from Bainbridge, in the southwestern part of the state, north to Arlington, about 30 miles. It is expected to connect with the Plant System at Bainbridge and with the Central of Georgia at Arlington. The officers are: President, J. B. Williams, Savannah, Ga.; Vice President, A. L. Haines, Bainbridge, Ga.; Secretary, H. J. Bruton, Bainbridge; Treasurer, G. W. Haupt, Savannah.

Gila Valley, Globe & Northern.—Negotiations are now in progress for finishing the road to Globe, Ariz. Terminal facilities are now being obtained at Globe and right of way through the San Carlos Indian Reservation, for which the company has offered \$10,000 in cash and payment for all damages. The road now extends from a connection with the Southern Pacific at Bowie, Ariz., northwest 68 miles to Geronimo. The extension will be from Geronimo northwest about 70 miles to Globe.

Jasper Southern.—Final surveys for this proposed railroad in Texas, to extend from Jasper south to a connection with the Gulf, Beaumont & Kansas City (which runs from Beaumont 51 miles north to Kirbyville), were finished June 21. The company was organized in Texas last month. W. W. Blake is Chief Engineer.

Mexican Roads.—The Mexican government has granted a concession to Eduardo Portu to build a railroad from Toluca, Mex., east to a point on the Mexico, Cuernavaca & Pacific, or direct to Mexico City, passing through Metepec, Chapultepec and Santiago. The terms of the concession require that the road must be completed within 10 years from June 22, 1897. The gauge is to be 60 cm. (1 ft. 11.6 in.) and the Department of Com-

munications must be consulted as to the weight of rails and other technical details. The concession does not carry a subsidy, but grants the usual free importation privilege for a term of 15 years.

Messrs. Mendez & Brinkman have been given a concession for a road from Tultenango, a station on the Mexican National, northeast to the hacienda of La Trinidad, passing through the mining camp of El Oro. Construction must be begun within 12 months from June 18, 1897, and the entire line must be completed within seven years from that date. No subsidy will be given by the government.

A report from Monterey, Mex., states that Francisco Armendaiz is in the City of Mexico making arrangements for building a railroad from Matamoros, at the mouth of the Rio Grande River opposite Brownsville, Tex., west to Monterey. The Mexican government will give the road a subsidy of \$8,000 a kilometer, and the state of Tamaulipas, through the northern part of which the road will pass, one of \$120,000. The road is to connect at Brownsville with the proposed Southwest Texas, to be built from Brenham, Tex., to Brownsville, via Corpus Christi.

Michoacan & Pacific.—A dispatch from the City of Mexico states that Superintendent L. R. Gordon has received instructions by cable from President R. R. Symon, at London, to make surveys for a new line from Yurecuaro, a station on the Guadalajara Branch of the Mexican Central, south via Zamora and Reyes to Uruapan, about 90 miles, also a branch from a point between Yurecuaro and Zamora west to Jiquilpan, on Lake Chapala.

Milwaukee, Benton Harbor & Columbus.—Twelve miles of track have up to the present time been laid on this road, five miles from Benton Harbor south to the St. Joseph River and seven miles from Buchanan north toward Berrien Springs. The latter is on the old St. Joseph Valley road, which is being rebuilt. Grading between the St. Joseph River and Berrien Springs, 11 miles, is finished and it is expected that track will be laid by the end of this month. It is proposed to extend the road from Buchanan southeast to Nappanee, Ind.

New Roads.—Surveys are now being made for a line which is proposed to extend from a connection with the Cleveland, Cincinnati, Chicago & St. Louis, at Shelby, Richland County, O., southeast about 17 miles, to Lucas, a point on the Pittsburgh, Fort Wayne & Chicago, also in Richland County, passing through Mansfield. It is reported that the contract for building the road between Shelby and Mansfield, 10 miles, has been given to W. H. Fetter & Co., of Mansfield, and that it is proposed to begin work about Aug. 1.

New York & Ottawa.—This company was incorporated in New Jersey, July 6, with a capital stock of \$3,000,000. The incorporators are Howard K. Wood, John E. Walker and Alfred Luttmann. The purpose of the company, as stated, is to build and operate a railroad in New York state and Canada, and also to build tunnels, bridges, canals, piers and hotels.

Norwich & Worcester.—At a recent meeting of stockholders it was voted to build the extension from Allyn's Point south six miles to Groton, Conn., which will enable the company to give up its running rights over the New London Northern, for which it now pays \$40,000 annually. The cost of the new line and needed improvements is estimated at \$500,000. This branch will give the New England, which leases the Norwich & Worcester, a line to a point near New London, which will be independent of the New London Northern (Central Vermont), which is now used to reach New London. The company's trains can be sent over the new line on the east side of the river and connect with the tracks of the New York, New Haven & Hartford, for entrance into New London, thus doing away with the connection by boats to New York.

Old Dominion & Carolina.—This company has recently been incorporated in North Carolina to build a short railroad to form a part of the Richmond, Blackstone & Southern, which is proposed as an air line between Ridgeway, N. C., and Richmond, Va., via Blackstone, Va., about 90 miles. The charter of the latter company has been secured recently by Petersburg capitalists.

Pennsylvania Midland.—This road, which has been finished from Cessna, Pa., north 13 miles, and partly graded 12 miles further, is shortly to be extended to Brooks Mills, Blair County, Pa. The ties and rails have already been contracted for, and it is expected that the cost of completing the line will be about \$150,000. The Common Pleas Court of Bedford County has authorized an issue of Receiver's certificates to that amount, which will form a first lien on all the property. The road when completed will connect the Bridgeport Division of the Pennsylvania at Cessna with the main line of the Pennsylvania at Brooks Mills. The road is now in the hands of John W. Rutherford, Receiver, who was appointed Oct. 24, 1895.

Sabine Terminal.—This company has been incorporated in Texas with a capital stock of \$50,000 to build a terminal road about nine miles long in and around the city of Sabine Pass, Jefferson County. The incorporators are A. Higby, W. S. Parkinson, C. H. Quinn, W. C. Parkinson and W. S. Osgood. The names of the first Board of Directors are given in another column.

Suffolk & Carolina.—An extension is proposed from Ryland, N. C., on the main line, south about 17 miles to Edenton, N. C. Surveys are now being made and local reports state that it is proposed to begin building in the fall. The road now extends from Suffolk, Va., where it connects with the Seaboard & Roanoke, south 40 miles to Montrose Landing, N. C., on the Chowan River.

Terminal Railway of Buffalo.—The contract for this road, which is to connect the Lake Shore & Michigan Southern at Bladell, N. Y., with the New York Central & Hudson River at Depew, has been given to George E. Smith & Co., of Detroit, the price being \$250,000. It is proposed to begin grading at once and to have the line in operation by fall. The road, which will be 11 miles long and double track, will extend from the Lake Shore yards at Bladell, across the tracks of the Lake Shore, and the Western New York & Pennsylvania by means of a trestle which is afterward to be replaced by an iron bridge, thence in a northeasterly direction, crossing the Hamburg electric road, overhead, and the Delaware, Lackawanna & Western, Erie, Lehigh Valley and New York Central by a cut about a mile in length, thence to the connection with the New York Central at Depew. A heavy cut will be necessary at the northern end of the road, which it is expected will furnish what filling is necessary at the southern end. The middle section will require little grading.

Van Zandt Central.—This company has recently been organized at Canton, Van Zandt County, Tex.,

with a capital stock of \$20,000 and has applied for a charter to build a road from Canton north about 13 miles to a point on the Texas & Pacific. The incorporators will be D. D. Thames, T. W. Tawles, E. L. Richardson, J. J. Utts, D. F. Clark, Thomas Clark, T. P. Davis, W. O. Williams, D. D. Sadduth and others, all of Canton.

Wilkes-Barre & Northern.—This road has been completed from Luzerne Borough, Pa., north 20 miles to Harvey's Lake, and the first through train was run over the new line June 27. The company was incorporated Jan. 30, 1896. The road extends from Luzerne Borough, through Shavertown, Trucksville, Dallas and Idetown to Harvey's Lake. It connects with the Wilkes-Barre & Wyoming Valley electric line at Luzerne Borough, and the cars will be run by electricity from that place into Wilkes Barre. The motive power of the new line will be steam.

Electric Railroad Construction.

Beaver, Pa.—The Beaver & Vanport Electric Railway Co., with a capital of \$12,000, has been organized to build a two-mile line between Beaver and Vanport and Mitchell's Spring, and a charter was granted to the new company July 1. The directors are John M. Buchanan, Beaver, President; Jno. T. Taylor, Wm. A. McConnell, Jefferson H. Wilson, Alex. T. Anderson. President Buchanan holds 190 of the 240 shares.

Berkeley, Cal.—Petitions for franchises will be asked for at the next meeting of the trustees of Berkeley. The roads as projected take in North Berkeley and give better communication between Northeast Berkeley and Lorein.

Buffalo.—The Buffalo & Depew Railway Co. has been granted a franchise by the Board of Trustees of Depew to build and operate an electric road between the places mentioned in the title. William B. Cutter, the director of the road, states that it is expected that cars will be running by next spring at the latest. He further states that it will take but 40 days to complete the road after the work is begun.

Chicago.—An ordinance granting the Metropolitan Traction Co. the right to build about 200 miles of street railroad in Cook County, has been passed by the County Board. The roads over which the franchise extends cover every point in Cook County outside of Chicago where it is at all likely a road will ever be needed. It is proposed to carry freight between the villages during certain hours. The new company is capitalized at \$10,000,000 and it is said that J. Pierpont Morgan, P. A. B. Winener, W. L. Elkins and Charles T. Yerkes, with other eastern capitalists are backing the scheme.

The Supreme Court has affirmed the decree of the lower court denying the petition for an injunction to prevent the construction of the General Electric Railroad. It is stated that the road will be begun within 10 days and that the electric conduit construction will cost in all about \$3,500,000.

Cripple Creek, Col.—Clough & Anderson, of Colorado Springs, has received the contract for grading three miles of electric road in the vicinity of Cripple Creek.

Garfield, N. J.—The Saddle River Traction Co. has been incorporated, with a capital stock of \$100,000, to build a line in the vicinity of Saddle River, Bergen County. C. R. Wise, of Passaic, N. J., is Chief Engineer.

Joliet, Ill.—The Kankakee, Wilmington & Morris Electric Street Railway Co. was organized on June 26. It is proposed to build the road from Kankakee to Morris, through the villages and cities of Deselem, Richey, Wilmington, Braidwood, Braceville, Diamond and Coal City to Morris, a distance of about 40 miles. The incorporators and first directors are Thomas J. Deven, Chicago; Frank B. Handwerck, Morris; August D. Ehrlich, Kankakee; Jacob A. Henry, Joliet; P. J. Cromwell, J. L. Lewis and C. L. Bennett, Wilmington. The capital stock is \$50,000.

Mansfield, Mass.—The new Mansfield & Norton Electric Railway Co. has been incorporated, with a capital of \$40,000. E. P. Hewins is Clerk and Treasurer, and the Directors are D. A. Brooks, D. S. Spalding, Franklin Mead, A. Paine, A. H. Sweet and G. H. Lovejoy. The line will run from the New York, New Haven & Hartford Railroad station in Mansfield, to the Trinitarian Church in Norton, 5½ miles.

Oxford, Me.—The Oxford & Welchville Electric Railway Co., has applied for a charter to build a line from Oxford to Welchville, a distance of 2½ miles. The estimates have all been prepared and construction work will be started as soon as the Railroad Commissioners approve of the route. George Hazen is President, G. W. McFadden is Vice-President, and J. B. Robinson is Treasurer of the company, the capital stock of which is placed at \$25,000.

Pensacola, Fla.—The property of the Pensacola Terminal Co. has been sold to W. H. Bosley, of Baltimore, for \$55,000. Mr. Bosley represented the principal stockholders, and was also the agent for the bondholders. It is stated that four or five miles of additional road will be laid and that the motive power of the present line will be changed to electricity.

Philadelphia.—The Pembroke Railway Co., with a capital of \$300,000, was granted a charter on July 2. The line is to begin at Cobbs Creek, Philadelphia, and extend westerly to the city line, thence to Whitehall, Delaware County. A number of connecting lines are also proposed. The incorporators include Edward Thompson, Nathan Spring, E. D. Wadsworth and H. C. Terry. Edward Thompson is President, and holds 5,996 of the 6,000 shares.

Saratoga, N. Y.—The Saratoga Northern Railway Co. has been incorporated with a capital stock of \$1,000,000 to build an electric road from Saratoga Springs to Wilton and Mt. McGregor, a distance of 11 miles.

Suffield, Conn.—The Selectmen of Suffield have accepted the plan of route for the Springfield & Southwestern Street Railway. The officers of the company state that construction work will be started immediately. The accepted route runs from the Massachusetts State line to Suffield Centre, through "Crooked Lane," thence westerly to West Suffield, and from there south to the East Granby town line. The charter provides that the road must be in full operation between the Massachusetts State line and West Suffield, a distance of 10 miles, on or before June 1, 1898, or their charter will revert to the Suffield & East Granby Street Railway Company. It is the plan of the company to eventually connect with lines of the Hartford Street Railway Co.; also to build

from the Massachusetts line to a point opposite Springfield, from which point they hope to gain an entrance to that city. The temporary organization of the company was recently perfected, with a capital stock of \$100,000, about \$45,000 of which has been paid in. The temporary officers elected are as follows: President, H. K. Ford, of Suffield; Secretary, E. P. Bartholomew, of Springfield; Treasurer, A. Lyon, of New York. It is believed that the company will soon be reorganized.

Tonawanda, N. Y.—Mr. Geo. P. Smith, General Manager of the Tonawanda Electric Railway Co., writes us that the company has been granted a franchise for an electric road on what is known as the River road or Niagara street, running along the bank of the Niagara River, from Buffalo city line through the town of Tonawanda and within the village of Tonawanda to Gibson street. It has also an application before the Board of Trustees of the village of Tonawanda for the balance of the River road or Niagara street, through the village of Tonawanda to the city of North Tonawanda, where it connects with the present line. The company has also made an application for a franchise for a road through North Tonawanda to the intersection of Oliver street with the Ward road, which in connection with the lines of the Tonawanda Street Railroad Co. in North Tonawanda, will give the company three lines of track through the city of North Tonawanda, all uniting at the intersection of Oliver street with the Ward road. From this point the road will run north through Wheatfield to Niagara. The company has located its road and is now obtaining the necessary right of way to the city line of Niagara Falls and within the city to the intersection of Niagara street with Sugar street. Application has also been made for a line on some of the principal streets of Niagara Falls. As soon as these several franchises are obtained the company proposes to begin the construction work. All the new tracks within the cities where the streets are paved will be laid with 90-lb girder rails with steel ties on a concrete foundation, with asphalt pavement between the tracks. Outside of the cities where its line passes over the right of way owned by the company, 80-lb. T-rails, 60-ft. lengths, New York Central Railroad pattern, will be used. The third rail will be laid similar to the one now in use by the New York, New Haven & Hartford. Within cities, however, the overhead trolley will be used. The line will be supplied with palace cars having automatic air brakes, cars to be 50 ft. in length, and made especially strong so as to be run at a very high speed, if desired.

GENERAL RAILROAD NEWS

Atchison, Topeka & Santa Fe.—The earnings for May and for the 11 months ended May 31 have been reported as follows:

	1897.	1896.	Inc. or Dec.
May:			
Gross earn.....	\$2,508,000	\$2,269,911	I. \$238,089
Oper. expen.....	2,044,062	1,788,593	I. 255,469
Net earn.....	\$463,938	\$481,318	D. \$17,380
Taxes and rentals.....	170,973	157,467	I. 13,506
Balance.....	\$292,965	\$323,851	D. \$30,886
Eleven months:			
Gross earn.....	\$28,179,177	\$26,850,823	I. \$1,328,354
Oper. expen.....	20,824,794	20,350,685	I. 474,109
Net earn.....	\$7,354,383	\$6,500,138	I. \$854,245
Taxes and rentals.....	1,742,306	1,777,647	D. 35,341
Balance.....	\$5,612,077	\$4,726,491	I. \$885,586

On June 30 at midnight the old Mojave Division of the Atlantic & Pacific, extending from The Needles, Cal., to Mojave, and previously owned by the Southern Pacific, passed into the hands of this company and will be hereafter known as the Santa Fe Pacific. At the same time the Mexico & Arizona Railroad and the Sonora Railway, extending from Benson, Ariz., to Guaymas, Mex., and heretofore owned by this company, passed into the hands of the Southern Pacific. An account of some of the details of this exchange was given in these columns on April 2 last.

Baltimore & Ohio.—S. M. Felton has completed his inspection of the physical condition of the company's property, made on behalf of the members of the New York Reorganization Committee. Mr. Felton gives as his opinion that 23,000 tons of steel rails would be sufficient for the actual present needs of the road, making possible the renewal of 172 miles of track. Another year would call for additional renewals. He considers that the present conditions of the road requires the laying of 21½ miles with heavier rails on the old main line between Relay and Washington Junction and recommends that all 67-lb. rails on the Second Division between Washington Junction and Cumberland be replaced by new 85-lb. rails, and that 62 miles of track be renewed on the Third Division between Cumberland and Grafton; that the 67-lb rails taken from the Second Division be used in renewing 20½ miles of track on the Fourth Division and 28 miles on the Pittsburgh Division.

Chicago Terminal Transfer Co.—The entire property of the Chicago & Northern Pacific was transferred to this company at midnight on June 30, and at the same time the company began to run the Chicago & Calumet Terminal. The transfer of this property finishes the reorganization of the Chicago & Northern Pacific in accordance with the plan dated May 4, 1897.

Concord & Montreal.—The Railroad Commissioners of New Hampshire have authorized the issue of bonds by this company, which is proposed to reimburse the Boston & Maine for its expenditure of that amount on account of the Manchester & Lawrence. This issue was authorized at a special meeting of the stockholders of this company held recently at Concord, N. H.

Erie.—The earnings for May and for the six months ended May 31 have been reported as follows:

	1897.	1896.	Inc. or Dec.
May:			
Gross earn.....	\$2,716,875	\$2,638,759	I. \$78,116
Oper. expen.....	2,066,540	1,939,875	I. 126,665
Net earn.....	\$710,335	\$698,884	I. \$11,451
Six months:			
Gross earn.....	\$14,525,253	\$14,631,916	D. \$106,663
Oper. expen.....	11,496,677	11,372,527	I. 124,150
Net earn.....	\$3,028,576	\$3,259,389	D. \$230,813

Green Bay & Western.—The owners of this road have acquired control of the Kewaunee, Green Bay & Western by the purchase of the interests of President W. J. Abrams, General Manager S. W. Champion and Secretary and Treasurer W. W. Cargill. The latter road extends from Green Bay, where it connects with this line, 35 miles east to Kewaunee, Wis., on Lake Michigan, and will give the company an outlet to that

lake and to the Ann Arbor Car Ferry Line. S. W. Champion, General Manager of both companies, has resigned, his resignation taking effect July 1.

Kansas City & Southern.—This road, which extends from Westport, Mo., southeast about 7 miles to Dodson, has been sold to De Witt C. Blair for \$5,000. The road, which has not been operated for some time, will be repaired and will then, probably, be made a part of the Kansas City, Osceola & Southern, connecting at Dodson.

Kansas Midland.—This road, which extends from Wichita to Ellsworth, Kan., 107 miles, and has been heretofore operated under lease by the St. Louis & San Francisco, will hereafter be operated as an independent line in charge of A. L. Wolff, Receiver. The following appointments took effect July 1: W. P. Homan, General Manager; C. L. Fountain, Traffic Manager and Auditor; George M. Whitney, Car Accountant; C. A. DeHaven, Master Mechanic; A. H. Jackson, Chief Engineer and Roadmaster. The company's new headquarters will be at Wichita, Kan.

Lima & Honeoye Falls.—This road, which for some time past has been controlled by the firm of Humphrey & Holdredge, coal dealers, has ceased operations on account of lack of business. The road extends from a connection with the New York Central & Hudson River at Honeoye Falls, N. Y., to Lima, four miles. Louis Roth, Lima, N. Y., is General Manager.

Louisville & Nashville.—The earnings for May and for the eleven months ended May 31 have been reported as follows:

	1897.	1896.	Inc. or Dec.
May:			
Gross earn.....	\$1,684,035	\$1,602,014	I. \$82,021
Oper. expen.....	1,152,867	1,135,091	I. 17,776
Net earn.....	\$531,163	\$466,923	I. \$64,245
Eleven months:			
Gross earn.....	\$18,711,657	\$18,742,324	D. \$30,667
Oper. expen.....	12,685,435	12,335,331	I. 350,104
Net earn.....	\$6,026,222	\$6,406,993	D. \$380,771

Mexican Central.—The earnings for May and for the five months ended May 31 have been reported as follows:

	1897.	1896.	Inc. or Dec.
May:			
Gross earn.....	\$1,090,380	\$795,889	I. \$294,491
Oper. expen.....	748,722	476,062	I. 272,660
Net earn.....	\$341,658	\$319,827	I. \$21,831
Five months:			
Gross earn.....	\$5,486,948	\$4,098,886	I. \$1,388,062
Oper. expen.....	3,611,157	2,539,097	I. 1,072,060
Net earn.....	\$1,875,791	\$1,559,789	I. \$316,002

Norfolk & Western.—The earnings for May and for the eight months ended May 31 were as follows:

	1897.	1896.	Inc. or Dec.
May:			
Gross earn.....	\$897,771	\$940,138	D. \$42,367
Oper. expen.....	688,439	778,136	D. 89,697
Net earn.....	\$209,332	\$162,002	I. \$47,330
Eight months:			
Gross earn.....	\$7,067,774	\$7,524,079	D. \$456,305
Oper. expen.....	5,128,436	5,959,639	D. \$831,203
Net earn.....	\$1,939,338	\$1,564,440	I. \$374,898

North Carolina.—Judge Simonton, of the United States Court at Asheville, N. C., gave a decision June 30 continuing the injunction preventing Governor Russell, of North Carolina, from annulling the lease of this road to the Southern Railway. The road is partly owned by the State of North Carolina, and was leased to the Southern Aug. 1, 1895, for 99 years. A few months ago the North Carolina Legislature passed a special law to annul the lease, but on March 9 an injunction was issued against Governor Russell restraining him from enforcing the law. In the decision the Court holds that North Carolina is a shareholder and not a sovereign. The jurisdiction of the Court is upheld and the main issues are set forth. One is a question of fact to ascertain whether the lease was executed without fraud in any respect, and is referred to a special master to take testimony and report to the Court within 60 days. Meanwhile, the restraining order against Governor Russell is continued.

Northern Pacific.—The earnings for May have been reported as follows:

	1897.	1896.	Inc. or Dec.
Gross earn.....	\$1,470,614	\$1,323,504	I. \$146,510
Oper. expen.....	1,045,147	1,179,406	D. 134,259
Net earn.....	\$425,467	\$144,098	I. 281,369
Taxes.....	42,900	35,829	I. 7,071
Balance.....	\$381,967	\$108,269	I. \$273,698
Other income.....	31,572	238,308	D. 206,736
Total net earn.....	\$413,539	\$346,577	I. \$66,962

The gross earnings for the nine months ended May 31 were \$13,558,075, and operating expenses \$8,327,769, making the net earnings \$5,230,306. Taxes amounted to \$86,080, and the company's miscellaneous income was \$179,058, making the total net income \$5,023,284.

Olean, Rock City & Bradford.—This company was incorporated at Albany, N. Y., July 2, as a reorganization of the Olean, Bradford & Warren Railway and the Olean, Bradford & Warren Railroad, the former extending from the New York and Pennsylvania state line to Bradford, Pa., and the latter from Olean, N. Y., to the state line, together making a road 23 miles long. Both roads have been operated under lease by the Western New York & Pennsylvania, which owns the entire capital stock of both companies. The capital stock of the new company is \$210,000. The road is narrow gage.

Union Pacific.—Articles of incorporation of the new company, formed as a result of the reorganization, were filed with the Secretary of State of Utah July 1. The capital stock of the new company is \$136,000,000. The Directors are: Edward Dickinson, J. H. Millard, J. A. Munroe, T. M. Orr, of Omaha; Alexander Miller, J. C. Harris, of Boston; Otto B. Kahn, H. C. Deming, Alvin W. Krech, F. M. Marburg, E. R. Adee, G. H. Squire, Lawrence Greer, of New York; G. L. Cannon and Le Grand Young, of Salt Lake City. Under the Utah law the company can purchase any other railroad stock and can extend any of its own lines. A brief account of the plan of reorganization was given in these columns last week.

Electric Railroad News.

Buffalo.—At a meeting of the stockholders of the Buffalo Railway Co., on June 29, it was voted to guarantee the bonds of the Buffalo, Bellevue & Lancaster Electric Railroad, which is in effect a step toward acquiring the property of that company.

Brooklyn.—The gross earnings of the Brooklyn Rapid Transit Co. are reported as follows:

	1897.	1896.
June:		
Brooklyn Heights.....	\$427,313	\$447,496
Brooklyn, Queens County & Suburban.....	68,185	65,023
Total.....	\$495,498	\$472,519
Twelve months, ending June 30:		
Brooklyn Heights.....	\$1,597,043	\$1,436,164
Brooklyn, Queens County & Suburban.....	718,646	702,964
Total.....	\$5,315,689	\$5,139,128

Chicago.—Stockholders of the South Side Elevated Railroad Co. (known as the Alley L) have voted to authorize an issue of \$1,500,000 of 4½ per cent. bonds for electrical machinery and apparatus for the road. One-half of the issue has been sold to the Illinois Trust & Savings Bank at 98½, and will be offered to the public at par.

Cicero, Ill.—The Cicero Town Board has passed an ordinance which, it is said, guarantees to the people of Cicero that within 18 months the electric roads will carry passengers from Cicero into the heart of Chicago by the way of the Lake Street Elevated and Union Loop for 5 cents.

Holyoke, Mass.—The State Railroad Commissioners have approved the lease of the Mount Tom Railroad to the Holyoke Street Railway Co. The term of the lease is 25 years, and the Holyoke company is to pay a semi-annual dividend of three per cent. on the \$100,000 capital of the Mount Tom company.

New York.—The Appellate Division of the Supreme Court has handed down a decision sustaining the order made by Justice Beach refusing to grant an injunction to prevent the change of motive power from horse to electricity on the Eighth Avenue Railroad, which is controlled by the Metropolitan Traction Co. Unless the company insists on waiting for a decision of the Court of Appeals, construction work will probably be begun within a short time.

St. Louis.—The Fourth & Arsenal Street Railroad was sold at auction on June 29 to Attorney Albert Armstein for \$70,050, subject to the first mortgage bonds and taxes. The original cost of the road, including taxes, is about \$120,000.

TRAFFIC.

Traffic Notes.

The Receivers of the Baltimore & Ohio have contracted with Detroit parties to run a car ferry line between Sandusky and Detroit. Two vessels will be put on, each capable of carrying 28 freight cars.

The Canadian Minister of Railways and Canals has recently received a request that the government canals be opened on Sunday, but has decided to maintain the present policy of keeping them closed on that day.

The railroads carrying coal from the mines in Ohio to the ports on Lake Erie have held a meeting and have decided to restore rates. Little information is given out concerning what the rates were or what they will be, but from statements in the *Toledo Blade* it would appear that large quantities of coal have lately been carried at rates very much below the tariff.

The St. Lawrence River and Thousand Island Steamboat Co. has been organized to run boats between Kingston, Clayton and Montreal. A press dispatch from Montreal says that the company will probably soon enlarge its fleet and run vessels to Quebec. The officers of the company are: President, Henry Folger; General Manager, Geo. H. Daniels (of the New York Central); Traffic Manager, B. W. Folger, Jr.

The scheme of the Populist state authorities of Kansas to get a reduction of freight rates on grain by simply notifying the railroad officers to make the desired change, seems not to be working very smoothly. The Atchison, Topeka & Santa Fe and the Missouri Pacific have sent communications declining to make reductions, and both roads send quite elaborate arguments showing the facts which make the desired reductions unreasonable.

Mr. E. W. Morsman, President of the Pacific Express Co., has sent to the Railroad Commissioners of Texas a long protest against the reduced rates on fruit and other perishable goods, recently promulgated by the Commission for the use of the express companies in that state. Mr. Morsman quotes a number of examples from the tariff to show that the Commissioners require the express companies to charge less than the railroads are allowed to charge for similar service by freight train, and more than 50 per cent. less than the railroads are allowed to charge if they carry the goods on passenger trains.

Chicago Traffic Matters.

CHICAGO, July 1, 1897.
The Chicago, Milwaukee & St. Paul announces that in view of the reductions made in lumber rates from Wisconsin Valley points by the Minneapolis & St. Louis and Chicago, Burlington & Northern roads, making serious reductions into Indiana and Illinois, it will be necessary for the St. Paul to make a reduction in rates from interior Wisconsin points. The exact rates to be made have not yet been decided upon, but the Wisconsin Central and the Northwestern are both interested, and will likely meet any cut made by the St. Paul. In sending out the notice of the St. Paul's proposed action Chairman Midgley states that the proposed reduction by the St. Paul is not a recent determination and suggests that the matter be arbitrated.

There is a lively controversy between the Chicago wholesale merchants and the Western roads over the refusal of the latter to grant the merchants' request for low rates to country buyers similar to those granted by the Eastern trunk lines to New York. The general passenger agents definitely decided to refuse the concession asked for; this stirred up a hornet's nest, but the railroads insisted that if they made the concession it meant applying reduced fares to every jobbing center in Western territory. They have been flooded with letters from the smaller commercial centers bitterly opposing the scheme as rank discrimination. But the roads show signs of weakening already, and may give in to the Chicago merchants. Another meeting is to be held.

Corn rates from points in Illinois were cut last Friday by the Illinois Central, which put in a tariff approximately reducing the rate to five cents from all points in the state where it was six or seven cents. The reduction from points taking higher rates was proportionate. Officials of the Lake Michigan Car Ferry deny the report of the sale of the company's plant to the Big Four.